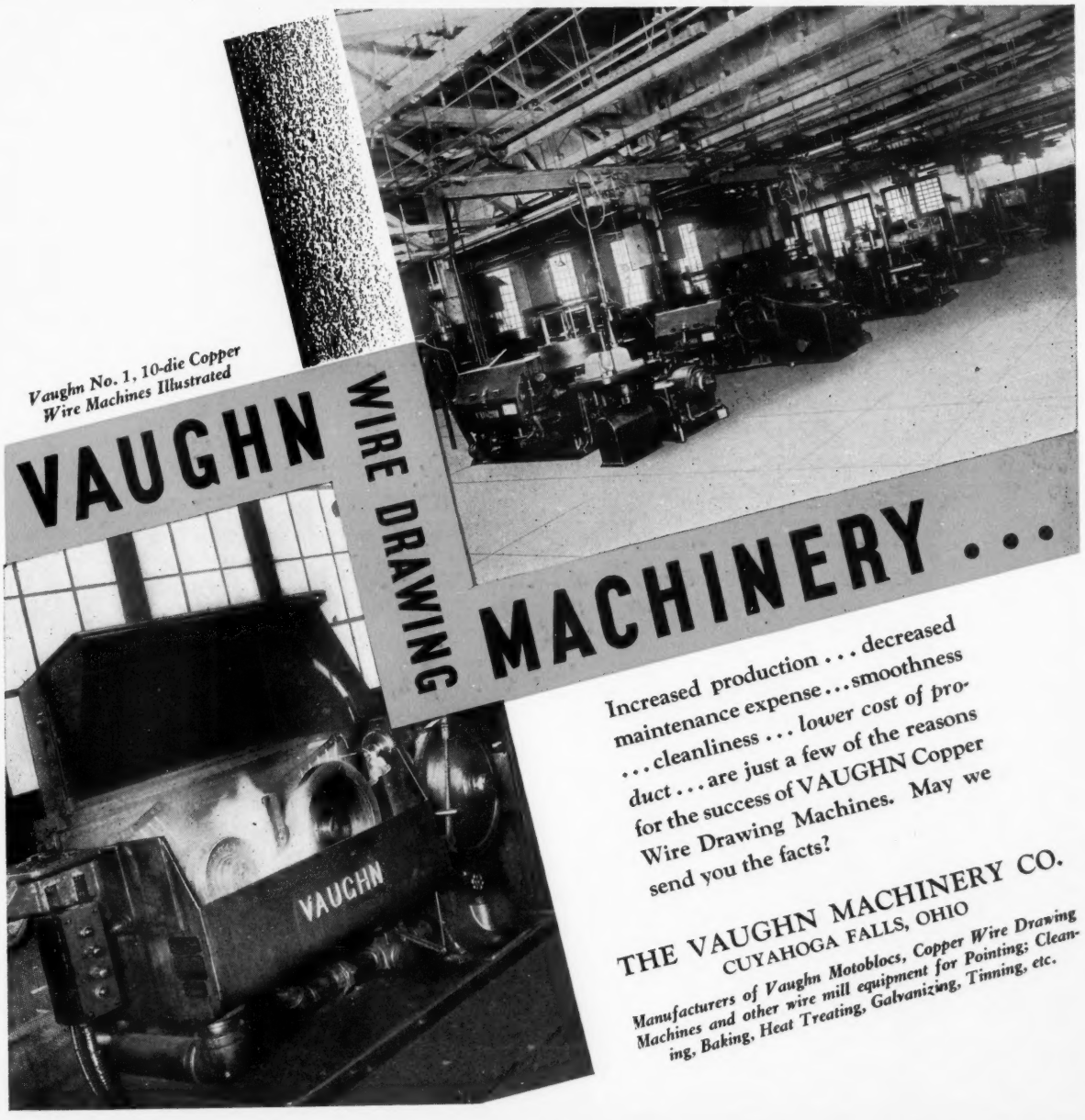
# WIRE & WIRE PRODUCTS

OFFICIAL PUBLICATION OF THE WIRE ASSOCIATION



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June 1932

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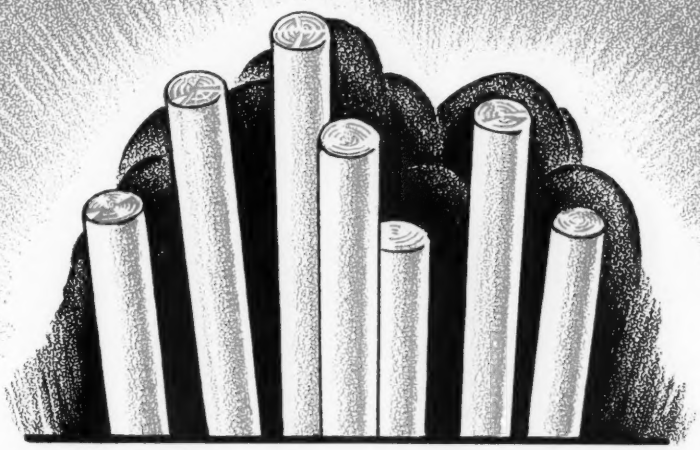

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# WIRE & WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip. Wire Products and Insulated Wire and Cable.

DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING.

Vol. 7 June 1932 No. 6

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During the week of
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In association
with the
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✦ ✦ ✦

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✦ ✦ ✦

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✦ ✦ ✦

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# WIRE & WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip.
Wire Products and Insulated Wire and Cable.
DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 7 JUNE, 1932 No. 6


# The Production of Lead Encased Cable


By Waldo L. Sherman
John Robertson Co., Brooklyn, N. Y.



Sixteen Leading Lead Encased Cable Manufacturers Answer Nineteen Questions Regarding Methods and Processes. The Recommended Table of Standard Practices Outlined in This Article is the Result of This Investigation. ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼


MANY manufacturers of insulated wires and cables consider the problem of installing lead encasing equipment with misgivings because they feel that it may complicate their manufacturing process and that they may have difficulty in getting a satisfactory return on the investment. They usually want to start in with equipment which has a very limited or small capacity, but the fact is that even the smallest lead encasing press outfit has a substantial capacity.

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## History

THE history of lead encased cable is familiar to every one in the industry. It had its beginning about fifty years ago when lead pipe in fifty foot lengths was used and the cable was pulled through the pipe, the joints being subsequently soldered together. This made the lead covered cable. It was a very slow and laborious process and was continued until the lead encasing die-block was invented by John Robertson in 1885. The lead encasing die-block made it possible to make the lead encasing process a machine operation.

IN the early days the capacity of the equipment was rather limited because the materials required for the construction of this equipment were not very strong. Charcoal iron was used for the castings and wrought iron for the forgings.

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THE earliest steel castings made were very unreliable and so it was many years before steel castings came into general use for hydraulic press parts. When these steel castings did come into use for hydraulic cylinders, it was necessary to use copper linings for two reasons: first, to prevent the hydraulic cylinder from leaking, and second, to present a smooth bearing surface on the inside of the cylinder for the hydraulic packings. Steel castings and alloy steel forgings have now reached such a high state of perfection that the capacity of hydraulic lead encasing presses has been greatly increased in power and the productive capacity of this equipment has also been increased many times. Only a few years ago the 2100-ton lead encasing press had a maximum capacity of approximately 1500 pounds of lead put on to cables er hour. Now a 2100-ton press of the latest design will apply 5000 pounds of lead covering to wires and cables per hour.

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## Present Equipment

LEAD cable encasing equipment in use today is of a great variety. It varies from being brand new in some plants to approximately 40 years old in other places. The total pressure capacity of the presses ranges from 500-tons to 3000-tons and the lead cylinder holding capacity ranges from 150-lbs. to 2000-lbs. of lead. The hydraulic pumps which are used require motors from 25 horsepower to 150 horsepower. In a few plants steam-driven horizontal hydraulic pumps are still in use. The lead melting furnaces include those which are using soft coal for fuel as well as gas, oil and electricity. The reel takeup stands vary from simple hand-operated stands to those which are power-driven and automatically controlled. In addition to these items, there are many other variations in the equipment.


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### Standard Practice

THE tendency towards standard practice in the operation of lead encasing equipment has been somewhat retarded because of the wide variety of equipment used and also because of the delay which there has been in setting up definite understandable specifications covering lead sheath. For many years it was thought that the best lead sheath was the one which had a uniform wall thickness, that is, concentric at every point and with the so-called joints or press stops as inconspicuous as possible. Foreign material in the lead sheath was considered an accident and unless it showed up on the surface was considered not to exist.

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DURING the past few years the service of lead encased cable has been more severe and frequent failures which have been expensive to the large users of lead covered cables have prompted them in self-defense to conduct investigations into the causes of the failures. The result of this research has been principally to demonstrate its value and up to the present time it can be truly said that this research has only just started. The cause of many failures is still unknown. The cure for many failures still remains a problem.

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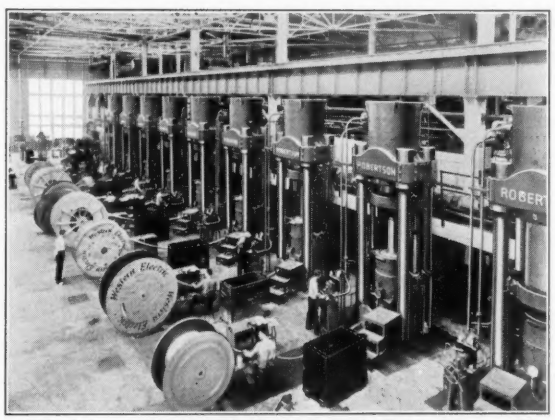
### Data Necessary for Successful Production

WHEN making lead sheath it is important to know about all of the conditions that go into the process as well as the quality of the metal which is used. To have this knowledge one must first start with a metal of known quality, be prepared to measure and control temperatures, know his corresponding operating speeds and pressures and maintain scrupulous care that foreign matter does not get into the extrusion cylinder. As a check on the result of all of this effort, frequent tests of the lead sheath should be made to show that unseen defects are not being produced. We recently sent a list of nineteen questions to manufacturers of lead encased cables so that we might compare the practice and the problems of the various users of this equipment. The replies to these questions from sixteen lead cable manufacturers showed that they were not unanimous in their replies to any one question. The questions sent to the cable manufacturers are listed below and opposite each question is an answer, which is either based on the replies or is information not contained in the replies, but which may be accepted as good practice.



Partial view of Lead Cable Department, Point Breeze Plant, Western Electric Company, Baltimore, Md.

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## RECOMMENDED STANDARD PRACTICE IN LEAD CABLE ENCASING

As Determined From the Replies of Sixteen Leading Lead Cable Manufacturers to Nineteen Questions on Process and Production Methods

| Questions | Answers |
|---|---|
| 1. Metal Extruded Mostly: | |
| A. Pure Lead? | Most plants use pure lead only. |
| B. Antimony Alloy? | Some plants use mostly antimony alloy. |
| C. What percent antimony? | 0.5% to 0.9% antimony is used. A slight variation in the percent of antimony between the above limits is of no consequence. It is a useless refinement to insist on an exact percentage of antimony. In any event, one percent should never be specified. As a matter of fact, the use of tin is much preferred by manufacturers and unless there is a real need for antimony as in the telephone industry, antimony should not be specified at all. If an alloy is required, one should bear in mind that there will be less defects with tin than with antimony. If you are looking for the best possible mechanical sheath, use pure lead. Next in order comes tin alloys, one-half of one percent antimony and up, but never one percent antimony. |
| D. What percent tin? | A few plants use tin, from 1% to 3% alloy. |
| 2. Variations in Wall Thickness Allowed? | Most plants use the specification of the cable users, which, as a rule is that the minimum thickness shall in no case be less than 90% of the specified thickness. The result is a maximum variation of plus or minus 10%. When somewhat better results can be obtained on modern equipment the above limits are the best commercial practice for incorporation in specifications. |
| 2A. Specified Wall Thickness: | This question was omitted, but it seems proper to mention the subject here. Any wall thickness may be specified, but those in charge of writing specifications should bear in mind that the thinner the lead wall the greater the number of defects and possible variations in wall thickness. Many cable sheath difficulties will be overcome by specifying an adequate, wall thickness. With the lead at its present price, it is "penny wise and pound foolish" to do anything else. |

| | |
|---|---|
| 3. Expansion Test:<br>A. How much is sheath required to expand before cracking?<br>B. What angle of taper is used for the expanding plug? | An expansion of two diameters is sufficient.<br><br>The angle of taper may be anything up to 30 degrees. |
| 4. Pressure Test:<br>A. How much pressure is applied per inch of dia.?<br>B. How long is sample held under pressure? | From 5 lbs. to 150 lbs. per sq. inch total hyd. pressure depending on dia. and thickness of lead wall.<br>From 24 hrs. to 6 months depending on whether it is a strength test or an endurance test. |
| 5. Bend Test:<br>A. What angle is used?<br>B. How many bends required? | 180 degrees.<br>10 bends. |
| 6. Purity of Lead Used:<br>A. Limits placed on arsenic?<br>B. Limits placed on bismuth?<br>C. Limits placed on copper? | The lead should be 99.85% pure according to A. S. T. M. standards, unless for special reasons limitations are required on the several impurities. |
| 7. Do you measure die-block temperatures?<br>A. What maximum temperatures are used?<br>B. What minimum temperatures are used? | Every die-block should be drilled for thermo-couples and an indicating pyrometer used to check the temperature of the several parts of the die-block.<br>Die-block temperature should be at least 325 degrees, but seldom over 375 dgrees.<br><br>The temperature of the die-block is important. |
| 8. Maximum speed of extrusion for any given size of lead sheath? | The speed of extrusion must be controlled to give a satisfactory product. It will vary from 50 ft. to 200 ft. per minute, depending on the size of the cable and the alloy extruded. |
| 9. Is lead sheath cooled immediately after leaving the die-block?<br>Does this affect the strength of the lead sheath? | It is usual practice to cool the lead sheath immediately after it leaves the die-block. The purpose of the water is to keep the cable cool.<br>Pure lead is not affected by water.<br>Water should not be used on lead sheath containing antimony as it causes age hardening; steam may be used for cooling antimonial sheath. |
| 10. Where are the samples of the lead all taken? | Samples of lead sheath should be taken before the cable is started thru the die-block and after the cable is finished. |
| 11. Where do most defects occur in lead sheathing?<br>A. Side of Cable?<br>B. Top of Cable?<br>C. Bottom of Cable?<br>D. At press stops, or at "joints"? | Pressure tests show that defects may occur anywhere on the cable. |
| 12. Do you get most defects when changing from lead to antimony or vice versa? | Changing from one metal to another should have no effect on the frequency of the defects. |
| 13. When changing from antimony alloy to pure lead, do you thoroughly clean out melting pot, or do you dilute last of antimony alloy remaining in kettle by adding pure lead? | It is necessary to clean out melting pot thoroughly when changing from antimony alloy to pure lead, or vice versa. In this way you always know what metal is in the pot. |
| 14. Do you clean out the die-block when changing from lead to antimony, or vice versa? | The die-block should be cleaned out when changing from lead to antimony, or vice versa; it gives you a uniform product from the very start. |

(*Please turn to page 204*)

# REPEATERS

By Robert A. Peterson,

Aetna-Standard Engineering Company, Youngstown, Ohio

**A Discussion of the Advantages of Mechanical Handling in Rod Mills --- The Repeater Installation at the Hawthorne Plant of Western Electric Company. Photographs by Courtesy of Western Electric Company.**

WHEN rolling metals in mills of the 3-high type, or where 2-high or 3-high mills are arranged in train or staggered so that the bar travels in one direction and then in the opposite direction during the process of reducing the bar, the front end of the bar must be entered properly into each succeeding pass. In many mills today operators must catch the bar with tongs as it emerges from one pass and properly enter it to a return pass in the 3-high stand from which the bar was delivered, or else to another stand which will roll the bar as it continues in an opposite direction. The man performing this operation is called a catcher or loop hand. This operation of catching the front end of the bar as it is being delivered from one pass and returning the bar in another pass before the bar is out of the preceding pass is called looping. It is obvious that time is saved in rolling and that the high temperature is maintained in the metal with all its advantages, when looping takes place as compared to allowing the bar to be in only one pass at a time. In many instances it is possible to perform the looping operation by some simple mechanical means called a REPEATER.

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REALIZING the advantages of Repeaters, such as more positive operation, more uniformly high rolling temperatures, economy and the elimination of a hazardous job, the engineers of the Western Electric Company, Incorporated, have developed and applied a number of ingenious repeaters to the copper rod mill at the Hawthorne Works as described below.

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THE examples cover several types of Repeaters. These same Repeaters can be used on mills which roll other metals. Also, different arrangements of stands will require different combinations of these Repeater units. The number of the various Repeater units to be used for each mill layout will best be determined by a study of the arrangement of stands along with a study of the sections being rolled. The example will, therefore, merely suggest ways in which each type of Repeater unit can be adapted.

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## Manual Operation

IN considering the description of Repeaters as applied to the cop-

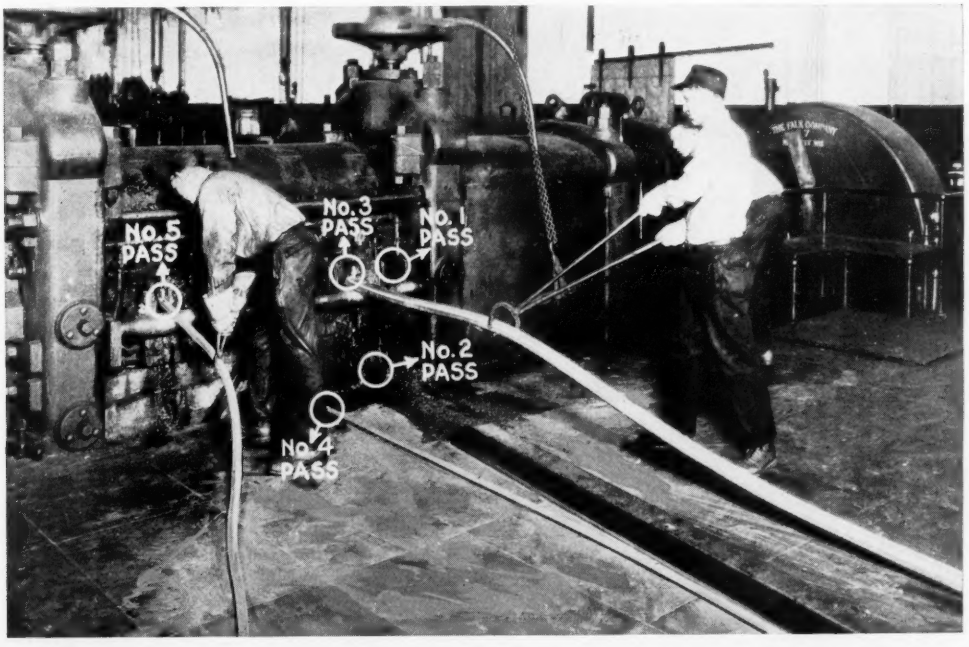


Figure 1. Three High Roughing Mill—Front View (manual handling). ✦ ✦ ✦ ✦ ✦ ✦

per rod mill mentioned above, we will first outline manual operation.

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FIRST, let us consider Figure 1. This shows the entering side of an 18″ 3-high breakdown or roughing mill with its normal operating crew of three men and one relief hand when doing the reversing and looping of the bar manually. A copper bar of about 54″ length and cross section of about 4″ x 4″ is used to start. With the help of a large pair of tongs suspended by a chain from a trolley traveling on a monorail, the two men wrestle a bar of about 250 lbs. in weight from the furnace to the first pass in this breakdown stand. This pass is between the upper two rolls. The bar entering the No. 1 pass had an area of about 14.7 sq. in., being approximately a 4″ x 4″ square with rounded corners.

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REFER next to Figure 2. This shows the delivery side of the same 18″ 3-high breakdown mill as shown in Figure 1. This view shows the normal operating crew of two men on this side of the mill who do the reversing of the bar manually. The bar which started with 14.7 sq. in. area was reduced in No. 1 pass to an area of about 8 sq. in. The bar came out on the flat of its 4″ x 2″ rectangular section. The bar would fall with its wide side on the floor. After the bar is entirely out of No. 1 stand, the operator with a pair of tongs turns this bar on its narrow edge to enter the bar on its return trip through No. 2 pass. No. 2 pass is in the lower two rolls, of course.

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REFER again to Figure 1. The rectangular bar of 8 sq. in. area which entered No. 2 pass on edge came out a square of about 4.27 sq. in. area or about a 2″ x 2″ square. After this bar was entirely out of No. 2 pass, this picture shows how two men with a pair of tongs attached to the chain from the monorail lift this square bar and enter it into No. 3 pass. The square enters on a flat side. No. 3 pass is, naturally, in the upper two rolls.

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IN Figure 2 the square bar of 4.27 sq. in. area which entered No. 3 pass on a flat side runs out its full length. It comes out of No. 3 pass with area of about 2 sq. in. as an oval about ¾″ thick. The oval came out flat. An operator with tongs turns this oval up on end preparatory to entering it into No. 4 pass. No. 4 pass is between the lower two rolls.

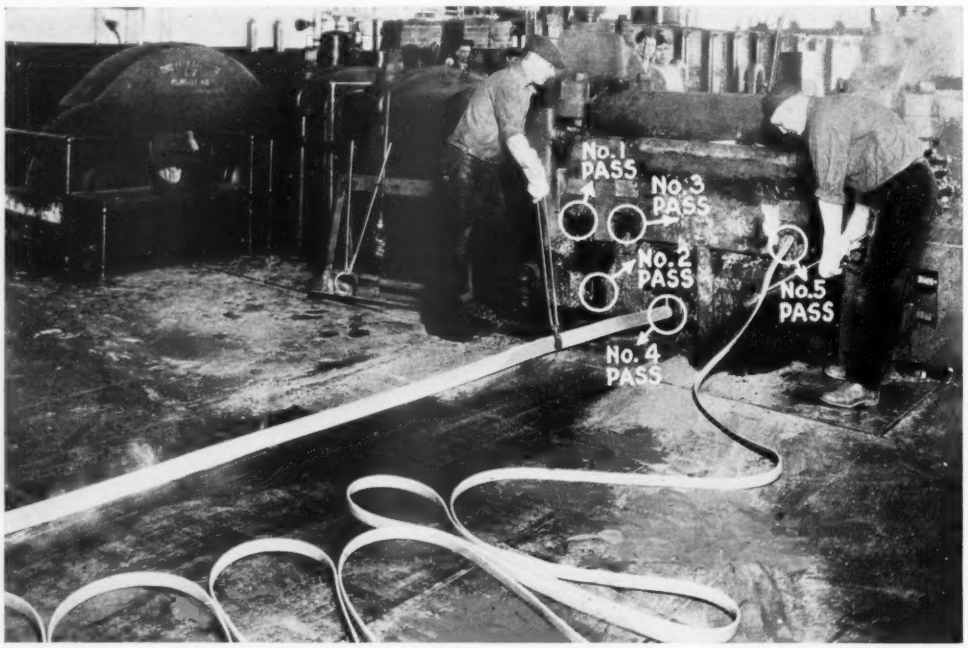


Figure 2. Three High Roughing Mill—Rear View (manual handling).

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IN Figure 1 the oval bar of 2 sq. in. area which entered No. 4 pass on end comes out of No. 4 pass a square of 1 sq. in. area with cross section of about 1″ x 1″. The square comes out of No. 4 pass on the diagonal. The picture shows the square coming out. While this square is still in No. 4 pass, the operator catches the front end of the square with a pair of tongs, swings around with his catch, and enters the square in the No. 5 pass. This No. 5 pass is between the upper two rolls.

FIGURE 3 shows the intermediate and finishing mill trains of this same mill in line. Four stands of 12″ intermediate rolls in train are in line with a train of five 14″ finishing rolls. Both trains are individually driven. The square bar of 1 sq. in. area which entered No. 5 pass of the breakdown mill comes out of No. 5 pass an oval on the flat of about .41 sq. in. area and about ⅜″ thick. The front end of this oval is caught by an operator with a pair of tongs and is turned on end to be entered into No. 6 pass. The intermediate and finishing stands are all of 3-high type so that in the same train a bar entered between the two lower rolls travels in one direction and when the bar is entered between the two upper rolls the bar travels in the opposite direction.

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IN Figure 3 the oval is caught by an operator with a pair of tongs and turned on end to enter each of passes 8, 10, 12 and 14, just as he did for entering No. 6 pass. Naturally, the oval is smaller in cross section in each of the succeeding passes mentioned above. The oval which is entered into No. 6 pass on end comes out a square. This square is caught

by an operator with a pair of tongs and entered into No. 7 pass. In like manner the ovals entered on end into passes 8, 10, and 12 are delivered by these stands as squares. These squares are caught by the operators with tongs and entered into passes 9, 11 and 13 respectively. The oval entering No. 14 pass emerges as a ¼" round to be coiled up in the reels.

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## Mechanical Operation

COMPARE the above description of manual operation with the following operation, using mechanical means for reversing and looping the bar where possible.

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LET us first consider Figure 4. A roller table not shown in this picture conveys the 4" x 4" bar from the furnace into the No. 1 pass of the same 3-high breakdown mill without the presence of an operator. The sections entering and being delivered in all passes would be identical with those sections used in manual operation as has been described in detail. The square bar enters No. 1 pass flat as before between the upper two rolls.

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REFER next to Figure 5. At the observer's left the bar is shown coming out of No. 1 pass on the wide side of the rectangular section. This rectangle comes out on a narrow ledge at an elevation about the same as the No. 1 pass line. The rectangle can rest on this ledge as long as the bar is still in the mill. When the bar leaves the mill, the ledge is too narrow for it to remain there. The bar, naturally, falls down. It falls in a channel shaped member which is of such size and design that the rectangular bar in falling comes to rest in the channel member on its edge. In its fall the bar hits a trip which actuates the plunger of a long air cylinder. This plunger pushes the bar into the No. 2 pass which is in the lower two rolls. As the bar passes through the rolls it eventually releases the trip in the channel which had actuated the air cylinder plunger, causing the plunger to go back in the cylinder in readiness for the next bar. This air cylinder extends from the end of the channel member away from the mill so that the plunger in coming out of the cylinder travels along the bottom of the channel member to push the bar into the lower or No. 2 pass. Thus far the bar has come out of the furnace, through No. 1 pass, has been reversed and run through No. 2 pass entirely mechanically.

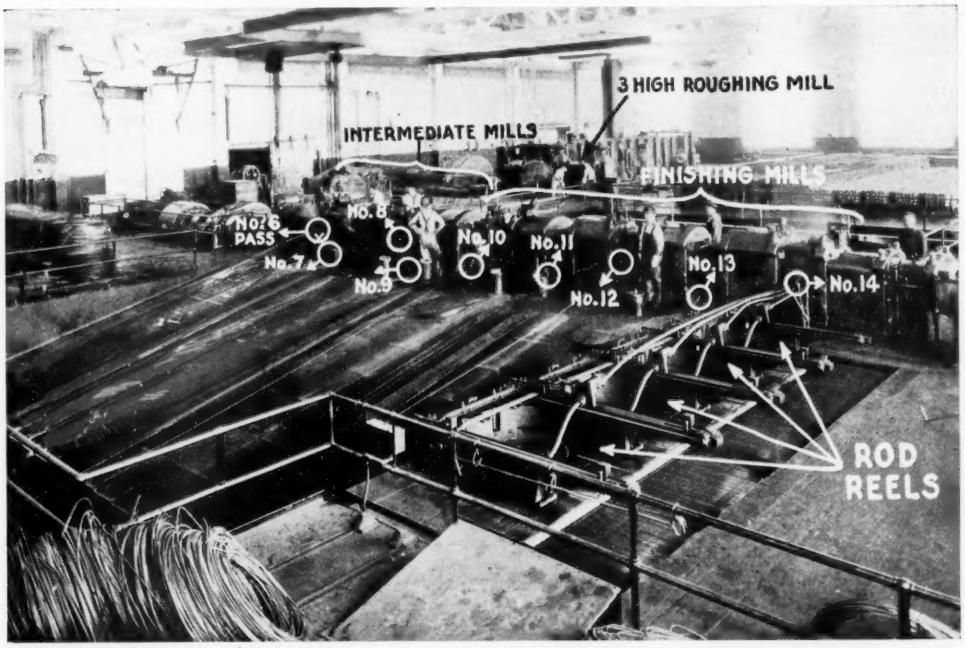


Figure 3. Intermediate and Finishing Mills—Rear View of Mill (manual handling).

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REFER again to Figure 4, and particularly to the Repeater which looks like a wheel with an air cylinder. Figure 7 shows an enlarged view of this Repeater taken from the opposite side. The rectangular section entering No. 2 pass on edge emerges as a square from the lower pass. Its travel out of No. 2 pass is confined in such a way that as the bar is being rolled out it is forced through this confined rectangular passage around the wheel into a straight rectangular shaped passage above the wheel into No. 3 pass. The bar necessarily must be entered in No. 3 pass before it leaves No. 2 pass because the rolling out of No. 2 forces the bar through this passageway until No. 3 pass grips the bar. No 3 pass is in the upper two rolls so that the bar really travels up above No. 2 pass and in a pass laterally away from the pinions farther than the No. 2 pass. In going from No. 2 to No. 3 pass, mechanical looping or repeating actually occurs. Naturally, the bar emerges from No. 2 pass and from No. 3 pass at approximately the same number of feet per minute. The area of cross section out of No. 3 is less than that out of No. 2 pass so a loop forms between No. 2 and No. 3 passes. The longer the bar is in both No. 2 and No. 3 together the larger does this loop grow. As the loop enlarges, it must have room to grow so that it will not jam within the limits of the confined passageway. A segment of this confined passageway is so designed that as the loop grows this segment is forced straight backward on crosshead guides against an air cushion. The segment is part of the crosshead. The air cylinder is mounted within the crosshead

guides. A piston rod is connected to the center of the crosshead so that the pressure of the loop upon the segment is transmitted to the air cushion within the air cylinder. As this segment is forced back the looped bar continues its course without jamming in the passageway. When the bar is out of No. 2 pass and also out of No. 3 pass, the air cushion forces the segment to its normal position to await another bar. The contour of the passage is especially shaped to facilitate the bending of the bar around the wheel. The construction of parts is very rugged to absorb the shock as this looping takes place. The air cylinder and pressure are so regulated that the looping operation has been completed before the growth of the loop takes place. Thus far, the bar has come out of the furnace, entered No. 1 pass, has been reversed through No. 2 pass and has been looped from No. 2 to No. 3 pass entirely by mechanical means.

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NOTICE particularly in Figure 5 the long runout trough to the observer's left of the center of the mill with the small drive unit to its right and close to the mill. The square which entered No. 3 pass is delivered from No. 3 pass as an oval. The oval is delivered on its wide side. It runs out on this trough which is equipped with a system of air timing valves, trip and table tilting cylinder, causing the bar to slide off of the trough into a long narrow channel alongside and below the tilting trough. The channel into which the oval bar fell is so designed that the oval had to stand on edge in the channel. The elevation of this channel is such that the oval is in line with No. 4 pass, which is between the lower two rolls to the side of No. 3 pass away from the pinions. The little motor in the view under consideration drives one roll of a pair of pinch rolls so located with reference to the oval in the channel section that with the help of an idle roll forming the other roll of the pair of pinch rolls, the oval bar is driven forward to enter No. 4 pass of the mill. The idle roll of the pair of pinch rolls is normally out of the way of the falling oval bar so that only the one roll is driven. The idle roll is connected to an air cylinder which normally holds this roll away from the driven roll. Between the pair of pinch rolls and No. 4 pass there is an adjustable guide so that an adjustment may be made for the oval bar to enter any pass which may be No. 4. The adjustable guide has small vertical idle rollers mounted on it to avoid the possibility of scratching the bar as it passes by. Thus far the bar has come out of the furnace, entered No. 1 pass, has been reversed through No. 2 pass, has been looped from No. 2 to No. 3 pass, and has been reversed through No. 4 pass entirely by mechanical means.

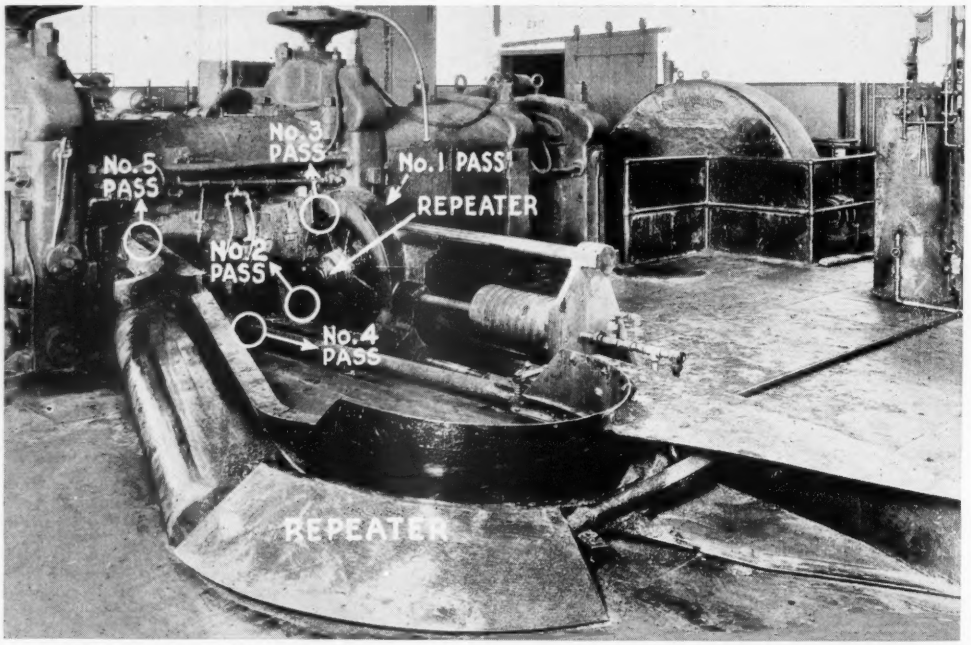


Figure 4. Three High Roughing Mill—Front View—(mechanical handling).

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REFER again to Figure 4. The oval bar entering No. 4 pass comes out a square. The square out of No. 4 pass enters a bell mouth attached to a pipe. This pipe and bell mouth can be easily shifted to accommodate the square bar coming from any one of various No. 4 passes in the rolls. The bar is delivered from the pipe to a semi-circular guide with a groove which is open on top. The square bar follows this groove around the guide and up an adjustable chute to another adjustable guide which enters the square into No. 5 pass. No. 5 pass is in the upper two rolls. In going from No. 4 to No. 5 pass mechanical looping or repeating actually occurs. Naturally the bar emerges from No. 4 pass and from No. 5 pass at approximately the same number of feet per minute. The area of cross section out of No. 5 pass is less than that out of No. 4 pass so a loop forms between No. 4 and No. 5 passes. As this loop grows it easily climbs out of the groove in the semi-circular section and grows out on a looping floor. As the loop passes out of the groove it travels over a long roller which tends to avoid scratching of the bar. The adjustable chute can be swung to accommodate any No. 5 pass in the rolls. No. 5 pass is above No. 4 pass and farther away from the pinions than No. 4 pass. This chute conducts the bar up and to the side. In the adjustable guide following this chute there

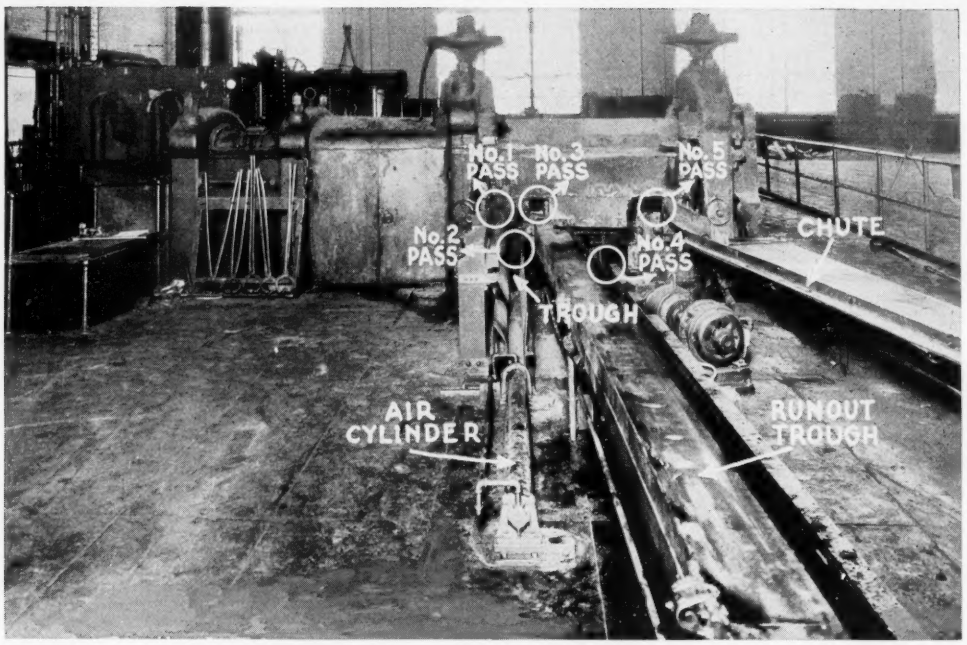


Figure 5. Three High Roughing Mill—Rear View (mechanical handling).

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are mounted horizontal and vertical idle rollers to help avoid scratching. This is the extent of the repeater mechanism on this side of the mill. The work which had formerly been done by three men and one relief hand on this side of the mill is now done entirely by mechanical means. Thus far the bar has come out of the furnace, entered No. 1 pass, has been reversed through No. 2 pass, has been looped from No. 2 to No. 3 pass, has been reversed through No. 4 pass, and has been looped from No. 4 to No. 5 pass entirely by mechanical means.

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IN Figure 5 refer to the chute at the end of the roll housing away from the pinions. Figure 9 shows a larger and more detailed view of this chute. The square which entered No. 5 pass of the 3-high breakdown mill comes out an oval. This oval is delivered out of No. 5 pass on the wide side. This No. 5 pass is the last pass in the breakdown or roughing stand. The oval section runs straight out on a long chute to No. 6 pass which is located in a separate 3-high stand about 30'-0" beyond the breakdown stand. The oval section coming flat out of No. 5 pass is entered on edge into No. 6 pass. This operation is accomplished mechanically in the following way:

The oval out of No. 5 passes first over a short section of trough. From this trough the oval continues on its flat side straight ahead upon a long chute. The mechanism shown in Figure 10 is located just beyond the end of the long chute at the extreme left of the observer in Figure 9. This oval on its flat side travels from the observer's left to the right in Figure 10. In its progress the oval passes through a bell-mouthed guide near the delivery end of which is a small roller under which the oval passes. The oval continues through a pair of pinch rolls which support and deliver the oval onward through a roller twist guide. This roller twist guide turns the oval up on its edge so that it travels through the bell mouth of a long narrow chute to enter No. 6 pass. The lower

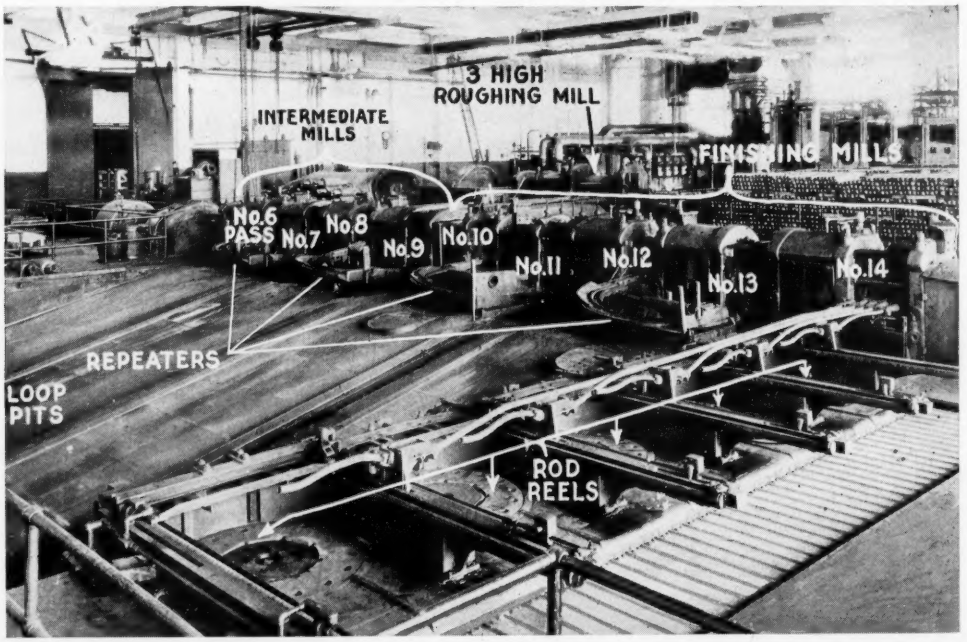


Figure 6. Intermediate and Finishing Mills—Rear View (mechanical handling).

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roll of the pinch roll is driven. The upper roll rides against the oval and the lower roll under adjustable spring tension. As the oval passes under a roller a trip is automatically operated which keeps a clutch in engagement on the oscillator drive. This is shown on the observer's right in Figure 9. The oscillator consists of a motor driving through a reducing gear to the driving member of a clutch. This oscillator is set in operation as the bar enters No. 6 pass. In its operation it slowly swings the end of the trough back and forth in a horizontal plane. This throws a wave into the oval bar coming out of No. 5 pass so that the bar is thrown down the inclined side of the long chute. This controls the loop as linear length of bar accumulates between No. 5 and No. 6 passes. The narrow chute beyond the roller twist guide has the end closest to No. 6 pass mounted to travel on rollers in substantially a horizontal plane. The other end of the chute next to the roller twist guide is pivoted. An air cylinder with bell crank is tripped into operation causing the chute to enter the oval on edge into first one and then the other of two No. 6 passes which are side by side in the same set of rolls. Thus far, the bar has come out of the furnace, entered No. 1 pass, has been reversed through No. 2 pass, has been looped from No. 2 to No. 3 pass, has been reversed through No. 4 pass, has been looped from No. 4 to No. 5 pass all in one 3-high stand, besides delivering an oval on edge into No. 6 pass located in a different roll housing. All of this has been accomplished entirely by mechanical means. The work which had formerly been done by three men and one relief hand on this side of the mill is now done entirely by mechanical means. This means a reduction of eight men by using mechanical means to handle the bar from the furnace through No. 6 pass.

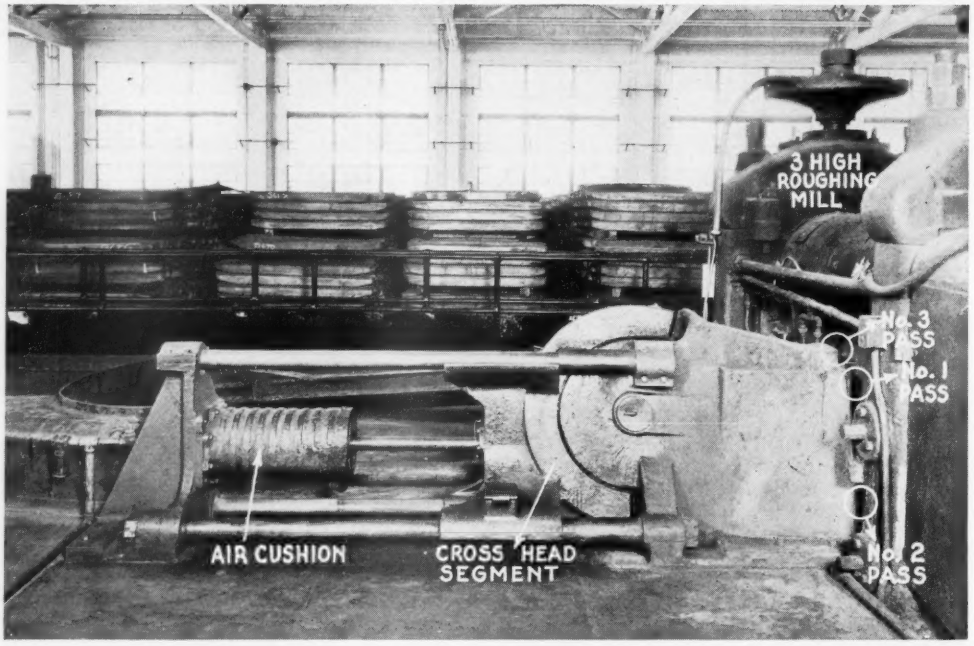


Figure 7. New Vertical Repeater—Front View of Mill.

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REFER next to Figure 6. In the background is shown the top of the three-high roughing mill which has been described. In the center of the picture are shown nine stands of the 3-high type arranged in train. The four stands

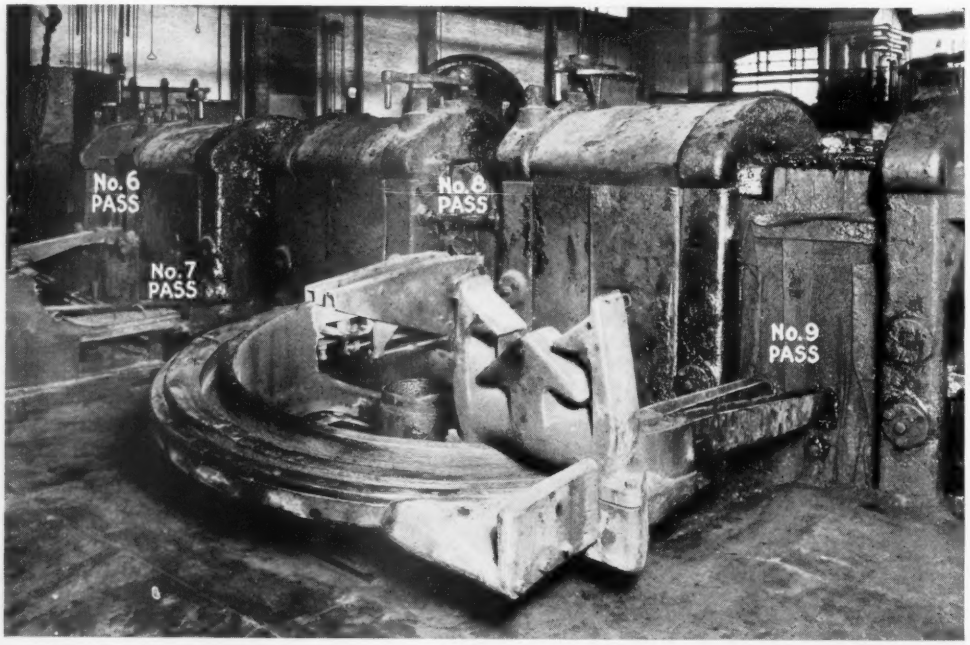


Figure 8. Eighth Pass Repeater—Rear View of Mill.

Figure 9. Rod and Wire Mill Chute between Roughing and Intermediate Rolls.

on the observer's left are driven by one drive and constitute the intermediate mill. The five stands on the observer's right are driven by a separate motor and make up the finishing mill. At the observer's extreme left of the intermediate train is shown a Repeater. The oval bar which entered No. 6 pass on edge came out of No. 6 pass as a square. Immediately out of No. 6 pass it entered a funneled spout which guided the square to a groove which went around in a semi-circle to the entry spout to No. 7 pass. The grove is one of two parallel grooves in this semi-circular repeater. As the feet per minute out of No. 6 and No. 7 passes is practically identical and since the section out of No. 7 is less than than that out of No. 6, there must be an accumulation or growth or loop between these two passes. The growth or loop just climbs out of the open groove and permits the loop to continue to grow down in the loop pits. The groove is only essential to properly enter the bar into No. 7 pass. The delivery of the bar from No. 6 can be from either of the No. 6 passes, as a separate spout and groove in the repeater is provided for each of the two passes. This same type of repeater is shown in Figure 6 for the oval from No. 8 pass to be looped to No. 9 pass also, from No. 10 pass to No. 11 pass and from No. 12 pass to No. 13 pass. Figure 8 shows more intimately the repeater used in guiding the oval from No. 8 pass to No. 9 pass. The only difference in the repeaters after stands 6, 8, 10, and 12 mentioned above is that possibly those after No. 10 and No. 12 might be equipped with three or four spouts and grooves. With the use of the repeaters at these stands, the ovals from stands No. 7, 9, 11 and 13 are the only ones which must be caught by hand to loop them to stands 8, 10, 12 and 14 respectively.

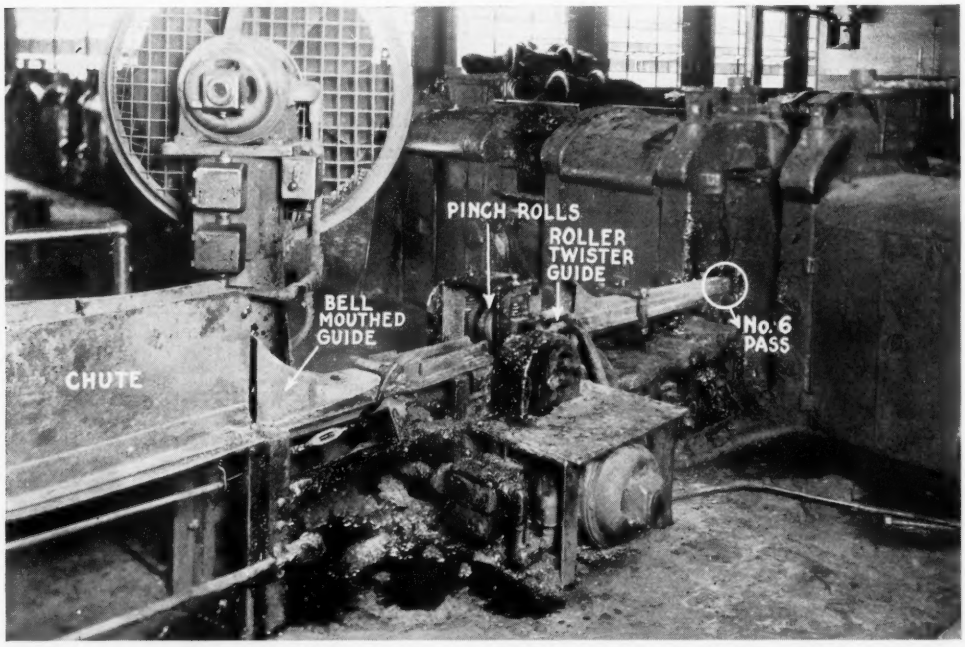


Figure 10. No. 6 Pass—Front View of Mill.

## Advantages of Repeaters

THE repeaters lend themselves particularly to more efficient operation at the roughing or breakdown stand of mills, starting with heavy sections. The manual handling is usually cumbersome and

(*turn to page 208*)

# Methods of Heating and Cooling Wire

PART II

J. A. Doyle, Vice-President,
W. S. Rockwell Co., New York, N. Y.

**The points brought out in this article are extremely important, particularly those dealing with the question of uniformity.**

**It attempts to call to the attention of metallurgists and wire mill men the necessity for care in the operation of furnaces.**

**Many products have been made "defective" by the carelessness or thoughtlessness on the part of operators in charge of furnaces, and this article brings out much that is of interest along this line.**

## Strand Heating Furnaces

SOME of the many electric and fuel furnaces designed to meet different standards of uniformity of structure and finish without departing from the principle of exposing the individual strand are illustrated on page ? . There are other designs based on different methods of handling coil stock without materially departing from the principle of uniform exposure. Heavy stock that will remain rigid under heat may be uniformly heat-treated in batch furnaces by opening the coil as illustrated by D, Fig. 2, which is the practical equivalent of heating and cooling in strand form.

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ALTHOUGH the method of handling varies with the nature of the stock and plant conditions, it is desirable to maintain a practical approach to the principle of uniform exposure in order to maintain high standards of uniformity. In practice the metal may be exposed directly to the heat in the chamber or passed through alloy metal or refractory muffles in a fixed atmosphere to maintain the desired surface condition, or it may be heated in a bath. When the rate of cooling must be prolonged and controlled it is usually necessary to cool at a fixed rate in a non-oxidizing atmosphere to avoid structural variations and discoloration.

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## Commercial Requirements

COMMERCIAL standards of quality, particularly in annealing, usually permit variations in uniformity incident to heating and cooling the individual coil, or a mass of coils, either in an open chamber or in a pot. However, the effect of physical conditions related to exposure is fundamental. As standards of quality and uniformity become more exacting the need for a practical approach to the ideal condition of uniform exposure will become more apparent. Need for improvement may suggest less coils in a given charge; smaller pots, or pots of different shape; different methods of exposing the individual coils; smaller or open coils, etc., until as the demand for quality and uniformity in structure and finish become still more exacting, it will be necessary to expose the individual strand or coil in one form or another in the process of heating and cooling. The method of handling will vary with different production conditions even though there be no variation in the requirements for uniformity in the stock itself.

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## Coil Heating Furnaces

DIFFERENT forms of electric and fuel furnaces developed for heat-treating ferrous and non-ferrous metals in coil form, with and without provision for bright annealing, are illustrated on page 143. There are many others including different forms of bath type furnaces and special designs developed to meet individual requirements for quality and production. Each type of furnace has its limitations and field of usefulness, the limits of which can be determined only with reference to the metallurgical requirements of uniformity and specific shop conditions.

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## Oxidation

OXIDATION is not entirely a matter of atmosphere, as is usually assumed. The composition of an oxide reflects the nature of the atmosphere affecting the surface of the metal, but the *amount* of the oxide is greatly influenced by the time of exposure to a given atmosphere. As the time, rate and uniformity of heating and cooling is affected by the manner of exposure, it follows that a method of exposure that will decrease the time of exposure automatically tends to decrease the amount of oxide or other surface discoloration. The time is decreased as the surface of the metal exposed to the heating and cooling atmosphere is increased. This condition is approached as we decrease the size of the batch or pot, and as we approach the ideal condition of exposing the individual tightly wound coil, or the individual open coil, or the individual strand. The method of exposure influences the surface condition of the metal just as it affects the uniformity of the metal itself.

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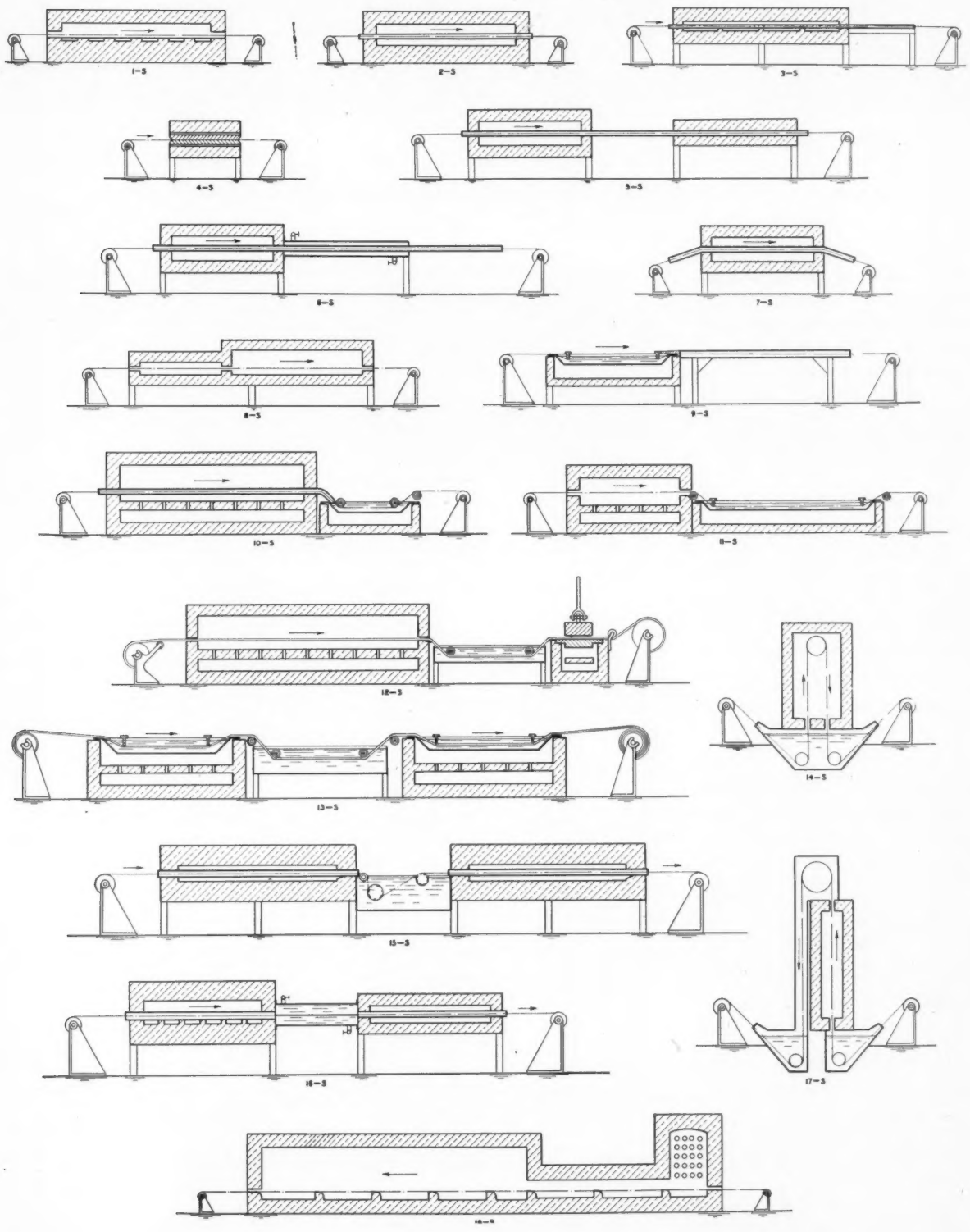
## Bright Annealing

"BRIGHT annealing" is an indefinite and relative term, like "quality" and "uniformity". It may apply to any one of different methods of annealing without oxidation in different types of electric and fuel furnaces.

## TYPICAL STRAND HEATING FURNACES



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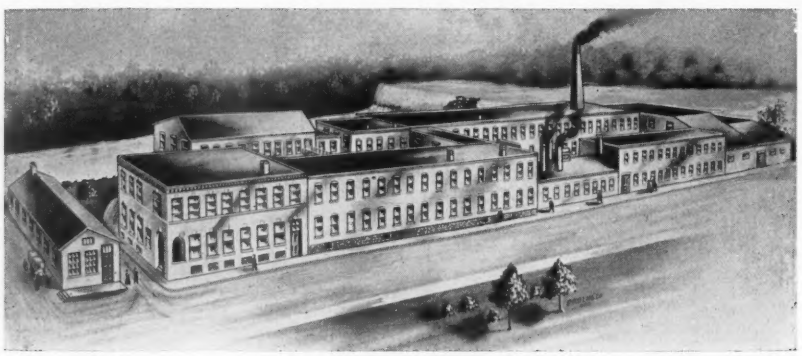

GENERAL VIEW OF PLANT, WINSTED, CONN. ▲ ▲ ▲

Products of leakage currents attack insulation and shorten the life of the coil. ▲ ▲

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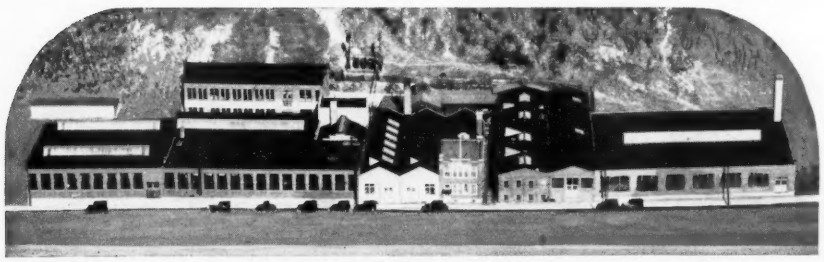

AERIAL VIEW OF PLANT OF HUDSON WIRE CO., OSSINING, N. Y. ▲ ▲ ▲
▼ ▼ ▼ FINE WIRE MANUFACTURERS ▼ ▼ ▼

### "HUDCO" High Conductivity Electric Wire

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BRUSH WIRES, CRIMP and STRAIGHT

Brass, Steel, Nickel Silver, Copper and Phosphor Bronze

TINSEL LAHNS

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Copper, Bronze, Zinc, Lead and Aluminum

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"Hudco" copper wire used for is drawn by the Hudson Wire Company of Ossining, N. Y., who have been specialists in the manufacture of fine wires for over thirty years. ▲ ▲ ▲

The best grade of copper drawing stock is used, insuring the maximum conductivity. ▲ ▲ ▲

A new process of drawing and annealing is used which produces a wire unusually smooth, clean and uniform in color for enameling and other purposes. ▲ ▲ ▲

Painstaking care in the selection and maintenance of dies guarantees a product accurate to gauge and resistance. ▲ ▲ ▲

You can rely on "Hudco" wire always. ▲ ▲ ▲

Expert annealing of the wire prevents unnecessary breakage when winding the wire into coils. ▲ ▲ ▲

If you, too, have a specific problem demanding wire of exact requirements, write to us about it. ▲ ▲ ▲

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"HUDCO" FINE WIRES

## HUDSON WIRE COMPANY

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"HUDCO" FINE WIRES

Estab. 1902 Estab. 1902

Uniform bright annealed metal implies metal of uniform structure with a uniform bright surface. Its production requires removal of drawing compound or roll oil, in the annealing operation or otherwise, to avoid discoloration in heating, and a method of cooling that will maintain the bright surface without subsequent discoloration.

In practice, less exacting requirements for surface condition permit a process of annealing without oxidation to produce a uniform metallurgical structure without a uniformly bright surface appearance; or a uniform surface appearance without an equally uniform metallic structure. Either of these is frequently accepted as the equivalent of "bright annealing" even though there may actually be a difference in structure or appearance, or both.

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### Clean Annealing

"CLEAN annealing" may be considered a term to define a process of annealing without oxidation but without a uniformly bright surface appearance, with or without uniformity in the metal itself. The common practice of annealing copper in coils without oxidation and without a uniform clean and bright surface illustrates the point. Metal may be uniformly heated and cooled, without oxidation, in strip form without uniform surface appearance; or, it may be heated and cooled in coil form, without oxidation, with metallic variations incident to the coil structure, but with a uniform surface appearance. The difference is in the relation of the uniformity of the metallurgical structure and the surface appearance of the metal.

Some form of a "clean annealing" process with provision to quench or cool slowly in a non-oxidizing atmosphere is usually sufficient to meet commercial requirements of annealing without oxidation. Heavy copper wire may be bright annealed in coil form to meet present day requirements and quenched immediately after heating to avoid oxidation. Smaller sizes of the same wire annealed on a spool may require a process of "dry annealing" to avoid possibility of discoloration from water stains incident to quenching in water or cooling in steam. The same wire drawn still finer to meet more exacting requirements of uniformity may require a process of heating and cooling in strand form in a gaseous atmosphere to insure uniformity in both structure and finish. Physical requirements for structure and finish may dictate different methods of annealing without oxidation, with or without actual uniformity in the metal itself.

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### Fuel and Electricity

THERE is no definite relation between quality and uniformity of heat-treated products and any one form of fuel or electricity or furnace. Each has its limitations and field of usefulness.

Heat-treatment is a process of transferring heat in a definite manner to and from the product to be heat-treated. It is not merely a process of generating and conserving heat and of controlling temperature. The manner of applying heat to the product is of greater importance than the manner of generating or controlling the heat itself.

Heat-treating is accomplished with heat—not with fuel or electricity, which are but means to the end. It is a process similar to cooking. The underlying principles apply with equal force in the heat-treating department of the shop and in the kitchen of the ordinary household. The difference is principally in the nature of the product and the "cooking" process.

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### Influence of Furnace Design

FURNACE design and operation controls the application, utilization, generation and conservation of heat. Efficient furnace design based on a reasonably practical conception of heat application, heat utilization and suitable method of handling the stock, under specific plant conditions, is the primary consideration. The form of fuel or electricity to be used for heating the furnace is a secondary consideration usually influenced by requirements of quality, production conditions affecting operation, relative cost, and market value of the ultimate product. Convenience, cleanliness, ease of control and working conditions are controlling factors in operating cost and greatly influence the choice of furnace and fuel regardless of comparative costs on B. T. U. basis.

✦ ✦ ✦

THE price of fuel or electricity is not as important as the amount consumed and the result measured in terms of quality and cost of the product and working conditions for the operatives. The result is accomplished by an intelligent mechanical combination of furnace design and method of heating and cooling adapted to specific production requirements. It is not due to inherent advantage of any form of fuel or electricity as such.

✦ ✦ ✦

### The So-Called Fuel Problem

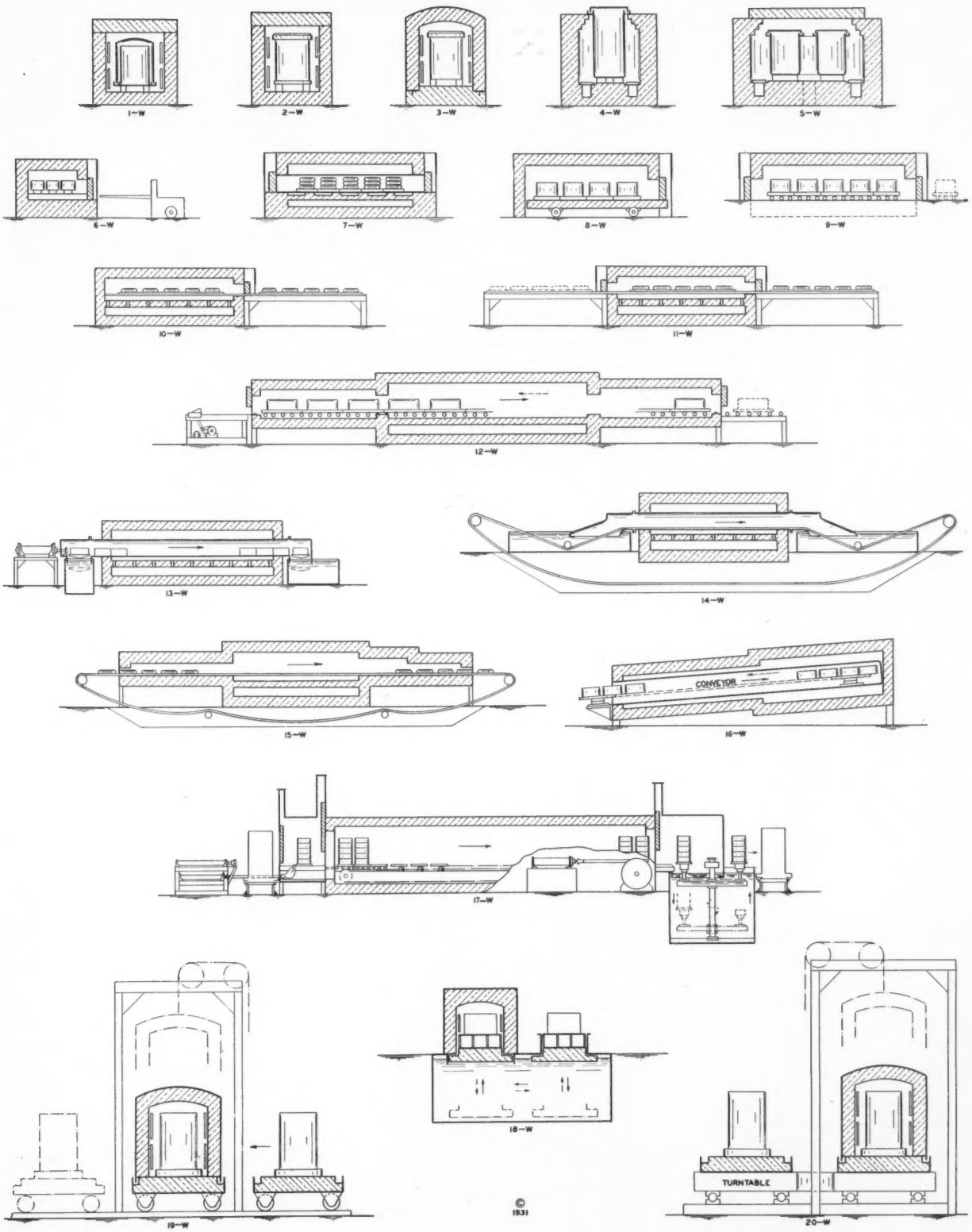
THE long prevalent controversy over the alleged relative merits of different forms of fuel and electricity, prompted by competitive commercial conditions, is largely beside the point and clouds the real issue. The relation is constantly changing with the development of improved designs of furnaces. Comparisons frequently made with claims for advantage attributed to one or the other are, in effect, but a comparison of specific types of furnaces operating under specific conditions. The relation may be changed with different types of furnaces or methods of operation in the same plant at the same time. Industry has long thought too much in terms of fuel and not enough in terms of heat and finished product. The so-called "fuel problem" will be solved in proportion to the manner in which industry learns to think in terms of better heating and cooling and better furnaces and their influence on the quality and cost of the finished product.

✦ ✦ ✦

THAT no one form of fuel or electricity has a monopoly on efficiency or cost is illustrated by the fact that strip steel stock may

(*Please turn to page 206*)

## TYPICAL WIRE ANNEALING FURNACES

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# Wire Questions and Answers

## Question No. 1225---Variation In Diameter and Thickness of Die Blanks

The Wire Association:

HERE is a question which I think would be of considerable interest to builders of wire drawing machines relative to the use of diamond or modern alloy dies which are set in round metal blanks.

There seems to be considerable variation in the diameter and thickness of these blanks as furnished by different die makers.

It would be very desirable on the wire drawing machine to have the pockets which support the dies recessed all the same diameter allowing a slight clearance, but with the existing variation of die blank diameters each pocket must be recessed to suit a particular make of die. This presents an unfortunate situation which could easily be overcome by die makers agreeing to a standard diameter of blank. The thickness of the blank is of comparatively little importance. It would be quite practical to have several diameters of blanks covering a range of die sizes. What I have in mind is more particularly dies used on continuous machines.

It seems to me your close association with die makers through your publication places you in a position to open this matter for discussion with the hopes of bringing about a standardization following modern tendencies.

I should be very glad to hear from you on this matter at your earliest convenience.

✦ ✦ ✦

### Answer No. 1

The Wire Association:

IN reply to your letter concerning relative variations in the diameter and thickness of die blanks and insofar as diamond dies themselves are concerned, will say that we have endeavored for several years to standardize these but have not been very successful.

At present we furnish 1" and 1⅛" dies, thickness varying according to the weight of the stone used.

We believe that the die holder should be slightly larger than the diameter of the blank in order to allow the die to revolve, otherwise the stone would wear out faster on one side. We are more than willing to standardize the blanks as this not only cuts down the supply that we have to keep but it makes the work so much easier to have only one size. We therefore suggest 1" as standard for diamond dies.

We think you should have the help of the wire drawing machine manufacturers.

We shall express no comment as to carbide dies as we believe this should be handled by the manufacturers interested in this type of dies.

✦ ✦ ✦

### Answer No. 2

The Wire Association:

WE have your letter bringing up the question of the variation in casing diameters on alloy dies.

If the manufacturer of the machines or whoever has brought up this question will check over the various sizes of dies that are furnished by the alloy die manufacturers he will find that within certain ranges of sizes that are furnished in the two smallest size nibs, the standard casing size is 1".

The next range of sizes which takes care of drawing up to No. 5 rod, the diameter is standardized at 1½".

On sizes larger than this, the various die manufacturers are governed more or less in the casing diameters by the size of the insert of tungsten carbide that the customer desires to use. All the die manufacturers have standardized on certain size casings for their various size nibs in these larger sizes but even with these standardizations, the various customers ordering these larger size dies have machinery or special die holders on which they require certain diameters or square casings and occasionally rectangular casings.

The die manufacturer naturally has to furnish what the customer asks for. There is, therefore, no way that the writer can see, to standardize any more than has been done on the larger size dies while on the smaller size dies, every die manufacturer has the same size casings for the various sizes of wire being drawn.

This is such a broad question that I believe the method of arriving at some standardization for this work would be not only to get the die makers together but to get the machine manufacturer and the wire drawer together and the three of them arrive at a standardization of diameters of die casings for various sizes of wire that could be formulated and adhered to by every one concerned.

We trust that this may lead to a better understanding between the various parties concerned and that you in your position, may bring this matter to the notice of everyone for further discussion.

✦ ✦ ✦

### Answer No. 3

The Wire Association:

IT is quite apparent that the practice which you have mentioned in your letter has been growing in chaotic magnitude, particularly during the last four or five years.

Differences in the diameters of die cases for continuous machines are due undoubtedly to the manufacturers of wire drawing equipment.

During the past few years, quite a number of different types have been designed, each with its own individual idea of casing sizes.

Just how die manufacturers can offset this practice, we are unable to state, but hope that corrective measures will eventually come from the mills where the differences as to casing diameters are most keenly felt.

✦ ✦ ✦

### Answer No. 4

The Wire Association:

WE are in receipt of your letter quoting correspondence received by you from one of the members of the Wire Association who suggests that a standard diameter of die blanks should be agreed upon by all the die makers.

This would no doubt be a good idea if it was sanctioned by the wire mills also. As it stands now there are a number of mills who seem to have their own reason for specifying the size of the blank they want.

The diameters which we find to be mostly in demand for diamond dies are 1¼" and next to that 1". Before filling an order of a new customer we usually obtain his instruction as to the size blank wanted.

As an example we wish to state that an order was filled by us a few days ago where the customers' instructions covered special size as well as special kind of metal to be used for the outer blank and it even stipulated the special kind of hard metal to be used for the inner core in which the diamond is embedded.

✦ ✦ ✦

### Answer No. 5

The Wire Association:

CASINGS for diamond dies in all sizes as furnished by all manufacturers have been standardized at 1" diameter except where the customer specifies

(*Please turn to page 203*)

The Wire Association is for the specific purpose of improving production methods. It was organized as a clearing house of ideas on technical problems and research work in all phases of practical wire drawing and wire working.

The following inquiries were received from and answered by members of the Wire Association. These inquiries are sent to the Secretary of the Association who acts as a central clearing point, and neither the names of the firms or individuals sending in the inquiry, or of the men or firms replying are divulged without permission.

**Join the Wire Association!**

# A Review of Recent Wire Patents

No. 1,843,452, ELECTRIC CONDUCTOR, Patented February 2, 1932, by Herbert C. Jennison, of Bridgeport, Connecticut, Assignor to The American Brass Company, of Waterbury, Connecticut, a Corporation of Connecticut.

The cable comprises a spirally wound stranded conductor, and a supporting core therefore, comprising a plurality of devices arranged end to end and spaced apart, each of the devices comprising two cup-shaped members, arranged in telescoping engagement.

✦ ✦ ✦

No. 1,843,580, MACHINE FOR FORMING SCREW THREADS, Patented February 2, 1932, by Andrew Rodriguez, of New Haven, Connecticut, Assignor to Sargent & Company, of New Haven, Connecticut.

Particularly, this machine is adapted for rolling threads upon the shanks of screw eyes or similar articles to be threaded, and the invention covers means to feed such articles toward and into the threading dies of the machine.

✦ ✦ ✦

No. 1,844,309, SPACING TOOL FOR HELICAL SPRINGS, Patented February 9, 1932, by George C. Batz, of Topeka, Kansas.

The objects of the invention are to provide a rotatable bit arranged for insertion between the coils of a helical spring and driving means to rotate the spring during the rotation of the bit, so that the coils will be properly spaced.

✦ ✦ ✦

No. 1,844,324, OIL-PROOF FLAME-RESISTING CONDUIT, ETC., AND METHOD OF MAKING THE SAME, Patented February 9, 1932, by Joseph A. Kennedy, of Pawtucket, Rhode Island, Assignor, by Mesne Assignments, to Anaconda Wire and Cable Company, a Corporation of Delaware.

This cable is provided with an envelope of stearin pitch as its flame-proofing element, and a sealing coat over this envelope, and an outer film of dried cellulose lacquer over the sealing coat.

✦ ✦ ✦

No. 1,846,636, TELEPHONE CABLE, Patented February 23, 1932, by Ernst Fisher, of Berlin-Tempelhof, Germany, Assignor to Siemens-Schuckertwerke Aktiengesellschaft, of Berlin, Germany, a Corporation of Germany.

The wire conductors are helically wrapped with overlapping magnetic tapes, the pitch of the tapes amounting to at least fifteen times the diameter of the conductor.

✦ ✦ ✦

No. 1,846,709, FASTENING ELEMENT, Patented February 23, 1932, by Paul W. Dillon, of Sterling, Illinois, Assignor to Northwestern Barb Wire Company, of Sterling, Illinois, a Corporation of Illinois.

Particularly, this invention relates to nails, the inventor providing a nail elliptical in cross section, and with a chiel-like entering wedge or end. It is claimed that when the element is driven into grained material, such as

**Complete Descriptions and Drawings of Patents May Be Had for 25 cents. Address, Wire & Wire Products, 551 Fifth Avenue, New York.**

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wood, with the grain in parallelism with the major axis of the element, a portion of the wood on opposite sides of the cutting edge will be cut away, the edges of the wood engaging such sides and along the shank of the nail or element.

✦ ✦ ✦

No. 1,846,825, SPRING STRUCTURE, Patented February 23, 1932, by Fred R. Zimmerman, of Chicago, Illinois, Assignor to Burton-Dixie Corporation, of Chicago, Illinois, a Corporation of Illinois.

One aim of the invention is to so crimp or bend the end coils or terminal rings of the springs and the tie wires initially, that they may be easily and readily sprung into interlocking engagement without additional bending.

✦ ✦ ✦

No. 1,851,980, DISCHARGE MECHANISM FOR NAIL DISTRIBUTORS, Patented April 5, 1932, by Thomas Lund, of Beverly, Massachusetts, Assigner to United Shoe Machinery Corporation, of Paterson, New Jersey, a Corporation of New Jersey.

Particularly, this mechanism is adapted for use with machines in which the nails are supported by their heads in their travel through the distributor, and are reversed in the direction of their advance after leaving the raceways. The inventor provides a discharge device which both moves bodily and turns about an axis, and cooperates with the raceways to limit the travel of nails therethru.

✦ ✦ ✦

No. 1,852,127, ELECTRIC CABLE, Patented April 5, 1932, by Frederick Palmer, of Brooklyn, New York, Assignor to Triangle Conduit Company, Incorporated, of Brooklyn, New York, a Corporation of New York.

The assembly includes a number of insulated wire conductors, a crimped bare conductor lying betwen them so that the axis of the crimped conductor lies in the plane of the axes of the insulated conductors, with fillers overlying the bare conductor and filling the space formed by the contour of the wire contour of the wire conductors and with a flexible non-metallic sheathing over all of the elements.

✦ ✦ ✦

No. 1,853,247, SPRING ASSEMBLY, Patented April 12, 1932, by Robert C. Winders, of Los Angeles, California.

The invention contemplates a noise-dampening tie for spring cushion assemblies. Cords are laced between the ends of the helical springs, which slightly overlap each other, and wire tie rods.

✦ ✦ ✦

No. 1,853,676, SUBMARINE CABLE, Patented April 12, 1932, by Ernst Fischer, of Berlin-Templehof, Germany, Assignor to Siemens-Schuckertwerke Aktiengesellschaft, of Berlin, Germany, a Corporation of Germany.

Insulated cable wires are combined into a cable core, with a lead sheath enclosing the core, while there is also provided condenser conductors adapted to compensate detrimental cross-talk couplings and are located within the sheath, at least some of the condenser conductors being electrically connected with the insulated wires.

✦ ✦ ✦

No. 1,853,677, TELEPHONE CABLE, Patented April 12, 1932, by Ernst Fischer, of Berlin-Templehof, Germany, Assignor to Siemens-Schuckertwerke Aktiengesellschaft, of Berlin, Germany, a Corporation of Germany.

Double conductors of wire are provided together with equalizing condensers having a cross section other than circular shape, with some of the condensers electrically connected with the wires.

✦ ✦ ✦

No. 1,853,877, WIRE WORKING APPARATUS, Patented April 12, 1932, by William Parker, of Oak Park, Ill., Assignor to Grigsby-Grunow Company, of Chicago, Illinois, a Corporation of Illinois.

Particularly, this invention relates to apparatus for shaping the wires of beads used in vacuum tubes. The assembly includes an anvil mounted on a frame, and adapted to support a bead before shaping, a number of sliding dies which advance on the wires of the bead to shape them, and an additional die which is adapted to advance after the other dies have completed their travel, to complete the operation.

✦ ✦ ✦

No. 1,854,503, METHOD AND MEANS FOR TYING SPRINGS, Patented April 19, 1932, by Charles Dietrich, of Cleveland, Ohio.

The claims in this patent cover only the means and not the method. The inventor provides means for locking some of the helical coils (of a bed or chair bottom spring assembly) against movement with reference to some of the tie rods and yet allowing others to be hinged with reference thereto,—the same tie rod being rigidly locked to one coil and hinged to the adjacent coil.

✦ ✦ ✦

No. 1,855,178, PORTABLE WIRE STITCHING MACHINE, Patented April 26, 1932, by Herbert R. Bliss and Howard G. Allen, of Niagara Falls, New York, Assignors to H. R. Bliss, Company, Inc., of Niagara Falls, New York, a Corporation of New York.

This is a portable, motor operated wire stitching machine, adapted for stitching coiled up wire to fibre board containers and the like.

✦ ✦ ✦

No. 1,855,571. CONTINUOUSLY LOADED CONDUCTOR, Patented April 26, 1932, by William Fondiller, of Yonkers, New York, Assignor to Bell Telephone Laboratories, Inc., of New York, N. Y., a Corporation of New York.

This is an electrical conductor loaded with magnetic material distributed thereon characterized in that the material consists of discrete strips having numerous openings in the strips which constitute air-gaps.

# 'Round the World With the Wire Industry

### Electric Cable and Wire Industry in France

**GEORGE F. Wadley** of Office of Consulate General, Paris, reports that the French maximum output of electric cables and wires is estimated at about 20,000 metric tons, valued at about 300,000,000 francs, but this figure has not been attained in recent years owing to special circumstances which have handicapped French manufacturers considerably.

While the extended use of electricity throughout the country has maintained, despite economic conditions, a fair demand for electric cables and wires, French manufacturers have been handicapped by the introduction of German cables and wires under reparations in kind. It is stated that 90 per cent of the total imports of these goods came into France under these conditions, the balance of the imports consisting of highly specialized types of electric wires.

✦ ✦ ✦

### Marking "Loose-Shipped" Iron and Steel Products for Peru

COMMERCIAL Attaché **Merwin L. Bohan,** Lima, Peru, reports that the Peruvian Ministry of Finance has confirmed that it is not necessary to show kilo markings on materials shipped loose, such as iron or steel bars, plates, structural steel, fabricated steel, rails, catchweight coils of wire and rods, and pipe shipped loose or in bundles, as the kilo weights which are given on the shipping documents are considered sufficient for duty assessment purposes by the customs authorities.

However, it is understood that in actual practice, in order to facilitate weighing and identification operations both at customs and consignees' warehouses, kilo markings are shown on plates, rails and similar thick materials shipped loose; and pipe, wire, rods, and thin materials in general are forwarded in bundles with markings shown on tags attached.

### New Zealand Duties on Wire Netting

A recent order in council of the New Zealand government provides that wire netting and iron wire of all kinds be exempt from the 3 per cent ad valorem primage duty levied on products otherwise duty free.

✦ ✦ ✦

### European Export Sales Policy

THE agreement between the IWECO and the principal European and British wire exporters provides, that the IWECO will stop trading direct with countries outside Europe, except the United States and Canada and that business outside Europe will be done only through the medium of approved merchants. From the European markets Portugal and Finland will be left to the trade and no direct business will be done.

✦ ✦ ✦

THE IWECO has now fixed the extras for barbed wire, wire nails (also packing in small parcels,) tinned wire, oval wire and the new list for wire netting is soon to appear. All continental and probably also the British industry will accept this list.

✦ ✦ ✦

CONTINENTAL wire exporters report that the American wire industry has adopted for export the same extras for dimensions and packing as the IWECO, except for thin wires (thinner than BWG 26) for which the American extras are higher.

✦ ✦ ✦

THE German wire exporters have received numerous inquiries for wire nails from Shanghai for the rebuilding of Chapei, the Chinese settlement in Shanghai. Inquiries go into thousands of tons. It is reported, that hoarded money will thus reappear to a great extent in China and facilitate reconstruction work. Many orders have been already placed. The European industry is assisted by the boycott of the Chinese merchants against the Japanese industry.

✦ ✦ ✦

THE German wire cartel has accepted 5 outsiders as members and is now controlling nearly 99% of the total production.

✦ ✦ ✦

THE generally higher prices for wire products in America is affecting favourably continental export business in wire products with the United States. January and February exports of wire nails and barbed wire are nearly 50% higher than last year. Direct shipping facilities to Chicago will be resumed in April and more than 1000 tons of barbed wire have already been purchased for shipment with the first sailing vessels in this spring season directly to the Lake Ports.

✦ ✦ ✦

GERMANY exported in the first 2 months of this year only 31,265 tons of wire and 5,177 tons of wire nails. This is 45% less than last year. However in March exports were up approximately 25% compared with February. The 10% import duty in Great Britain is not regarded as an unsurmountable barrier for German exports.

✦ ✦ ✦

THE demand for corrosion (copper bearing) steel wire is steadily improving. For fencing material approximately 1000 tons are exported monthly, chiefly with 0.25- 0.35% copper content.

✦ ✦ ✦

### Oval Steel Wire for South America

THE principal manufacturers of oval steel wire, which is used more and more as fencing material in Latin America and South America have determined to fix the strength (in accordance with the main importers) at 110/120 kilos per square mm, at a diameter of 12/14 BWG. This wire is meeting best the requirements of the South American wire consumers.

# Exports and Imports of Wire

**Exports of iron and steel wire products in Feb., 1932 and March, 1932**
(In gross tons)

| | March 1932 | February 1932 | March 1931 |
|---|---|---|---|
| Wire rods | 2,733 | 2,468 | 3,644 |
| Hoops, bands and strip steel | 2,127 | 2,340 | 3,778 |
| Plain Black or galvanized iron or steel wire | 1,397 | 1,045 | 1,101 |
| Barbed wire and woven wire fencing | 2,562 | 1,189 | 2,456 |
| Woven wire screen cloth | 56 | 44 | 86 |
| Wire rope | 145 | 191 | 272 |
| Insulated iron or steel wire and cable | 34 | 8 | 25 |
| Other wire and manufactures | 204 | 223 | 455 |
| Wire nails | 615 | 476 | 670 |
| Tacks | 36 | 36 | 29 |
| Other nails including staples | 412 | 223 | 324 |
| Bolts, machine screws, nuts, rivets and washers | 266 | 263 | 519 |
| Total, these 12 classifications | 10,587 | 8,506 | 13,359 |

**Imports of iron and steel wire and wire products into the United States**
(In gross tons)

| | | | |
|---|---|---|---|
| Concrete reinforcement and other bars | 6,816 | 5,411 | 9,264 |
| Wire rods | 973 | 843 | 455 |
| Barbed wire | 1,551 | 1,400 | 502 |
| Round iron and steel wire | 211 | 232 | 195 |
| Telephone and telegraph wire | 1 | .... | 9 |
| Flat wire and strip steel | 59 | 68 | 65 |
| Wire rope and strand | 146 | 129 | 247 |
| Other wire | 23 | 73 | 96 |
| Hoops and bands | 1,454 | 1,896 | 1,841 |
| Nails, tacks and staples | 930 | 797 | 676 |
| Bolts, nuts and rivets | 7 | 19 | 167 |
| Total, these 11 classifications | 12,171 | 10,868 | 13,517 |

GAINS were registered in 29 classes of products comprising the export trade, the more outstanding being those in scrap, 4,373 tons; and in barbed wire and woven wire fencing, 1,373 tons, while the only decline to exceed 1,000 tons was that in rails, which was 71 tons over this figure.

In point of tonnage the month's leading products were scrap, black steel sheets, wire rods, barbed wire and woven wire fencing.

✦ ✦ ✦

THE trade with Canada was featured by shipments of 2,865 tons of black steel sheets, 2,319 tons of skelp, 1,705 tons of plain structural shapes, 1,636 tons of scrap, and 1,325 tons of hoops.

Scrap (11,203 tons) was the leading item in the trade with Japan, to which wire rods added 1,548 tons.

✦ ✦ ✦

THE United States import trade in iron and steel products resumed in March the upward movement which had been interrupted by the decline registered in February. The outstanding gains were those in pig iron, 13,095 tons, tin plate, 2,503 tons, and concrete reinforcement bars, 1,004 tons.

THE Belgian total of 8,137 tons included 2,408 tons of concrete reinforcement bars, 2,034 tons of merchant steel bars, and 1,651 tons of structural steel. Germany, the third market of the month, supplied in all 4,458 tons of ferrous products in which were included 1,239 tons of barbed wire, 743 tons of nails, and 722 tons of merchant steel bars.

✦ ✦ ✦

IMPORTS of card clothing rose to 6,347 square feet ($6,858) and included 5,380 square feet ($6,005) from the United Kingdom, and smaller quantities from Germany and Switzerland.

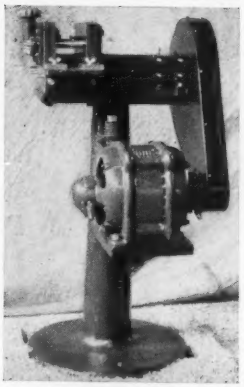
✦ ✦ ✦

WIRE cloth and screening imports also rose—to 25,790 square feet—Germany supplying 15,118 square feet, France 8,230 square feet, and Canada the rest.

✦ ✦ ✦

FOURDRINIER wire receipt dropped to 76,906, with Germany and Austria supplying 25,566 square feet and 25,538 square feet, respectively. Smaller quantities were received from France (15,244 square feet) and Sweden (10,558 square feet).


RUESCH



Roll Strip Straightening Machine
For Thermostatic Metal, Brass and Steel
Wire, Tube and Brass Mill Machinery

H. J. RUESCH MACHINE CO.
409 Mulberry St., Newark, N. J.


WIRE fencing and netting imports declined somewhat from the February total, that galvanized before weaving totaling 3,073,830 square feet (1,974,955 from Germany, 572,625 from the Netherlands, and 526,250 from Belgium), and that galvanized after weaving totaling 4,539,625 square feet (2,729,975 from Germany, 1,521,900 from the Netherlands, and 287,750 from Belgium.)

✦ ✦ ✦

IMPORTS of wire heddles declined to 2,043,000, of which 1,226,000 are shown to have been of French origin, 635,000 of Swiss origin, and 182,000 of German origin.

✦ ✦ ✦

JAPAN, it is reported, imported 65,167 tons of wire rods in 1931—this business going, first, to the United States; second, to Germany; and third, to France. Receipts in 1931 had a value of Yen 4,219,170, while the 68,684 tons imported in 1930 were valued at Yen 5,496,358 and the 157,474 tons brought in during 1929, at Yen 13,577,258.

# Outstanding Personalities of the Wire Industry

## CARL V. DODGE

**Carl V. Dodge,** manager of roll and steel casting sales of United Engineering & Foundry Company, has been elected a vice president of the company. He has been identified with roll and steel casting production and sales of the company for 26 years.

Mr. Dodge received a high school education at Rochelle, Illinois, and in 1904 became a shipping clerk in the chilled roll foundry department of United Engineering & Foundry Company at Candergrift, Pa. Later he became foreman of the cleaning floor and order clerk. In 1913, he was transferred to the Pittsburgh office as a steel casting and roll salesman. During the world war, he had charge of the steel casting sales of the company. In 1931, with the consolidation of the casting and roll sales departments, he was named assistant manager of sales and a year ago upon the death of William Gardner, vice president, was named manager.

Mr. Dodge has a broad working knowledge of foundry operation and practice, combined with unusual commercial ability. He has been a material factor in the development work in connection with cast steel annealing boxes widely used in the steel trade.

## HARRY M. THOMAS

WITH deepest regret we record the passing on March 7th, 1932 of **Harry M. Thomas,** Production Manager of the Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pennsylvania.

His death was sudden, caused by heart trouble which had been little suspected.

Aged 46, he had spent his entire working life of 30 years in the Hazard factories. Starting at the age of 16 as a laborer in the Wire Mill of the old Hazard Manufacturing Company, by diligence and ability he made his way forward until he had reached the position of Superintendent of the Insulated Wire Division, when in January 1928 this department of the original Hazard enterprise was purchased by The Okonite Company.

Okonite immediately recognized his unusual qualifications, which combined production knowledge with leadership and energy. Probably few men in any Insulated Wire factory possess as intimate a knowledge of all the technical details of manufacture as Mr. Thomas was able to command without reference to data sheets. Okonite made him Production Manager, and he immediately adapted himself to Okonite policies.

Most of the staff with Mr. Thomas were lifelong associates, and all were stunned at the sudden loss of the leader who had become so much a part of their life.

His funeral was largely attended, and the factory foremen were his pallbearers. The honorary pallbearers included R. M. Eaton, Superintendent and Resident Manager, H. E. Charles, Plant Engineer and D. R. Stevens, Vice-President and Works Manager of the Okonite companies.

## GEORGE H. BUCHER

AT a meeting of the Board of Directors of the Westinghouse Electric International Company held in New York, January 27, **George H. Bucher** was elected vice president and general manager.

Mr. Bucher joined the Westinghouse organization September 1, 1909, as a graduate student. He graduated from the Pratt Institute in Brooklyn in both steam and machine design and electrical engineering. He was transferred from the graduate student course at East Pittsburgh to the export department in New York January 20, 1911. April 1, 1920, he was appointed assistant to general manager of the Westinghouse Electric International Company. July 1, of the following year he was appointed assistant general manager which position he held until his recent appointment.

He is a member of the A. I. E. E. and vice-president of the New York chapter of the Westinghouse Veterans' Employees' Association.

He will make his headquarters at 150 Broadway, New York, N. Y.

# New Machinery

## Sleeper & Hartley, Inc. Introduce A New Type of Vertical Spindle Milling Machine

A VERTICAL spindle milling machine which is a distinct departure from the usual types and which operates on an entirely new principal has been placed on the market by Sleeper & Hartley, Inc., of Worcester, Mass.

✦ ✦ ✦

AS the name implies, the Universal Milling Machine is entirely universal in its operation in that it is capable of finishing five surfaces of work without changing the position of the piece on the table. Milling operations can be performed on any of these five surfaces and holes in the vertical plane may be bored, drilled or tapped under power.

✦ ✦ ✦

TO outward appearance this machine, as illustrated, resembles some of the planer-type millers but, however, the table is stationary and the housing with its rail and spindle head travel over the work on ways. In the planer type miller however additional floor space is necessary to accommodate the sliding table. In the Sleeper & Hartley Universal Miller the machine bed is fixed and this floor space is about 30% less than that required by the ordinary planer or planer-type miller of like capacity.

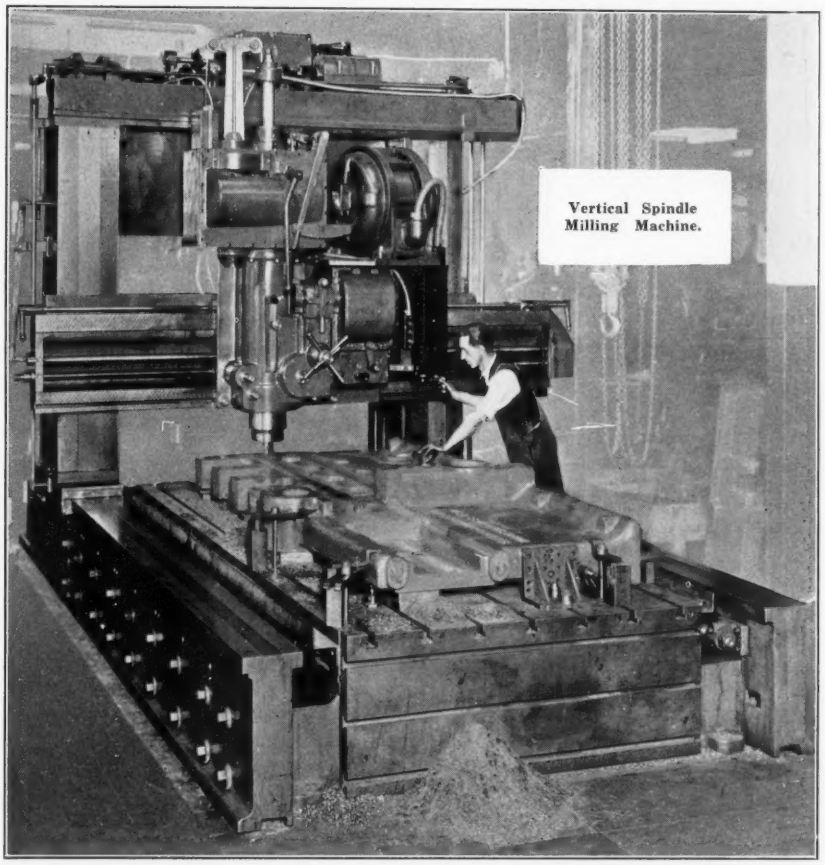
✦ ✦ ✦

ITS advantages over the planer-type miller are numerous. In addition to the considerable saving in floor space and the added safety feature of a fixed bed, the Universal Miller is able to finish five surfaces at one set-up of the work; greater accuracy is obtained due to the constant pressure of the head on the cutter, varying sizes of work causing no deflection of the table; and due to an unusual flexibility, speed and accuracy this machine will out-perform most of the less modern machines to be found in shops all over the country.

It is contended that for 75% of the general and special work for which planers and shapers are now being used, this machine will be found to be far in advance of anything previously offered the trade.

✦ ✦ ✦

WHILE these machines are in no sense specialized and are equipped with universal adjustments for general shop work, they will be found superior to most of the special milling machines designed in late years for mass production.



Vertical Spindle Milling Machine.

✦ ✦ ✦

THE physical characteristics of this machine show good design and careful workmanship. The vertical spindle of the machine is mounted in anti-friction bearings and takes the standard spindle-end. The "box"-type base has been cast in one piece with internal bracings to give permanent rigidity. The side frames are also of a box section and particularly strong, being gibbed to the track and provided with binders to prevent possible lifting. They are adjustable for any wear.

✦ ✦ ✦

THE cross-rail is of a particularly deep section to insure strength and stiffness under all conditions, yet this rail does not interfere in any way with the travel of the head and in fact extends some distance beyond the frames to allow maximum head travel. The cross-tie is extra wide and deep to give stiffness and positive alignment.

✦ ✦ ✦

ALL feeds on this machine are motorized, two motors pro-

vided ample power. The travelling head may be fed in any direction with a wide choice of speeds. The traverse operates in either direction and is interlocking with the vertical feed. Since it may also be operated independent of the longitudinal feed, it is possible to cross-traverse or cross-feed while the head travels lengthwise of the table.

✦ ✦ ✦

THE cross-rail is also power actuated and once positioned is held in place by a powerful clamping device. This clamp can be operated from either side of the machine, hence the operator does not have to leave his post of best advantage. In fact all of the controls of this machine are readily accessible.

✦ ✦ ✦

ALL electrical controls are of the push-button and controller-box types, located so as to be most convenient, while gear shifts are ready at hand on either side of the machine, a labor-saving novelty which saves much time for the operator. In addition cossfeed controls are also located at the head itself.

✦ ✦ ✦

THE spindle is driven by a four-speed 10 hp. motor mounted on the same frame as the spindle and moving with it, the connection being by direct worm gear. By means of a back gear arrangement, lever-controlled, eight spindle speeds may be obtained. A separate 7 hp. motor mounted on the top cross-tie provides the power for all feeds and motion of the head, speeds of travel being obtained through a gear shift. The housings slide along the ways under the impulse of a powerful longitudinal screw.

✦ ✦ ✦

THAT the principles under which this machine operates is correct has been demonstrated by two smaller machines of the type which Sleeper & Hartley have been operating in their own shops for the past 10 years. These machines have been called upon to do all manner of work and have responded without a breakdown between them in the past decade. These machines, in addition to the larger edition now announced, are ready for inspection under working conditions at all times in the Worcester plant.

✦ ✦ ✦

SPECIFICATIONS on the new machine are:—Distance between housings, 6 feet 2 inches; maximum height of cutter, 50 inches; vertical travel of spindle, 15 inches; capacity of machine, 14 feet by 8 feet; floor space, 20 feet by 13 feet; table area 12 feet by 5 feet 2 inches; and weight, 45,000 pounds.

✦ ✦ ✦

SPINDLE speeds range from 16 to 49 r. p. m. on the back gear; 102 to 307 r. p. m. on direct gear. Spindle feeds are from .001″ to .270″ per revolution of the spindle. The housing feeds on direct gear are from .002″ to .406″ on direct gear and from .0015″ to .305″ per spindle revolution on reverse gear.

✦ ✦ ✦

THE two smaller machines of this type of miller have capacities of 4 feet by 4 feet; and 6 feet by 8 feet, the extreme height of the cutter in both cases being about 45 inches.

✦ ✦ ✦

## United Engineering & Foundry Co., Design Largest Roll Lathe

UNITED Engineering & Foundry Company has completed the largest roll lathe ever constructed. It was made in the Pittsburgh shops of the company.

This huge lathe was designed to serve the tremendous rolling mill installations in the steel industry during the past 12 months and several of *even greater size* now in prospect.

✦ ✦ ✦

ALTHOUGH nominally a 70-inch lathe, which compares with a maximum of 60 inches in the industry heretofore, it will take a roll 82 inches in diameter and 26 feet long overall with its standard equipment, and, with slight modifications of the tool equipment can swing a grooved or straight-face roll 88 inches in diameter.

✦ ✦ ✦

THE principal demand for rolls of such large size is in the continuous wide hot strip mills and four-high plate mills which have been changing the entire process of rolling flat steel material. Practical foundry limitations formerly restricted the size of mills and rolls, but with the changes in the furnaces and other foundry equipment, introduced recently, the limits have been extended to new maximums. The giant roll lathe handles with ease the turning and dressing of both bodies and necks of all such rolls.

✦ ✦ ✦

THE new lathe is 49 feet long, all rolled-bearing equipped, with automatic lubricating system and numerous accessories. The cast steel bed plate alone weighs over 134,000 pounds.

✦ ✦ ✦

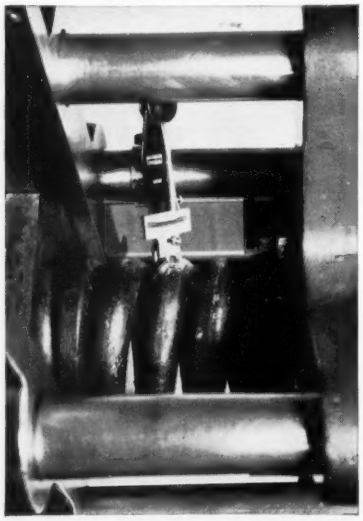
WHILE the lathe is the largest in the world in roll capacity, in power and in weight, it is designed to have the same ease of control as a small-sized lathe which may be seen in any roll shop.

---

## Measuring the Stresses of Heavy Coiled Springs

HEAVY coiled springs, like those under railroad cars, often break, although they have been built according to accepted design standards and formulas. Such failures caused A. M. Wahl, a Westinghouse research engineer, to make some unusual tests. He found the actual shearing stress in a spring was very much greater than that accepted by engineers.

✦ ✦ ✦



**The extensometer mounted on the spring revealed the magnitude of the stresses in a coiled spring underload and found the basis for new and adequate specifications for spring design.** ✦ ✦

HE also found that stresses inside the spring are often two and one-half times as great as those on the outside where measurements had always been taken. With these new facts it was a simple matter to design and make springs of the proper cross section and strength to eliminate breakage under the required loads.

✦ ✦ ✦

### Wire Questions and Answers

(*Continued from page 196*)

otherwise, and these irregular size diamond die casings are made necessary because one manufacturer of continuous wire drawing machines has provided room for casings of only 15/16″ diameter.

With regard to casings for alloy dies within the size range of the continuous wire drawing machines these are already fairly well standardized.

By consulting the catalogs of three of the principal manufacturers of alloy dies we find that all three furnish their first two sizes of dies in the 1″ diameter casing. The next or third size which would ordinarily be the largest size required for breakdown of 5 rod on a continuous machine is furnished by two manufacturers in an 1¼″ casing and by one in a 1½″ casing.

On the larger sizes there is some little variation in the different manufacturers casings. This variation is due to different opinions concerning the size casing required for resistance against breakage. This will be of little interest to the manufacturer or user of continuous machines.

If a machine manufacturer makes a recess slightly over 1½″ diameter on the first draft and slightly over 1¼″ diameter on the other drafts the machine would accommodate any well known make of alloy die. Any die manufacturers not now conforming to these standards will very soon fall in line.

As in the case of diamond dies there is one continuous machine which requires 15/16″ diameter casings, which requirement has to be met by the die manufacturers. This departure from standards has been made by the machine manufacturer.

One of the objections to alloy dies of larger sizes has been removed to a great extent. That is, frequent changing of casing diameters by the die manufacturers for the same size nib without notice to the customers. Now, all of the die manufacturers adhere strictly to their published casing dimensions.

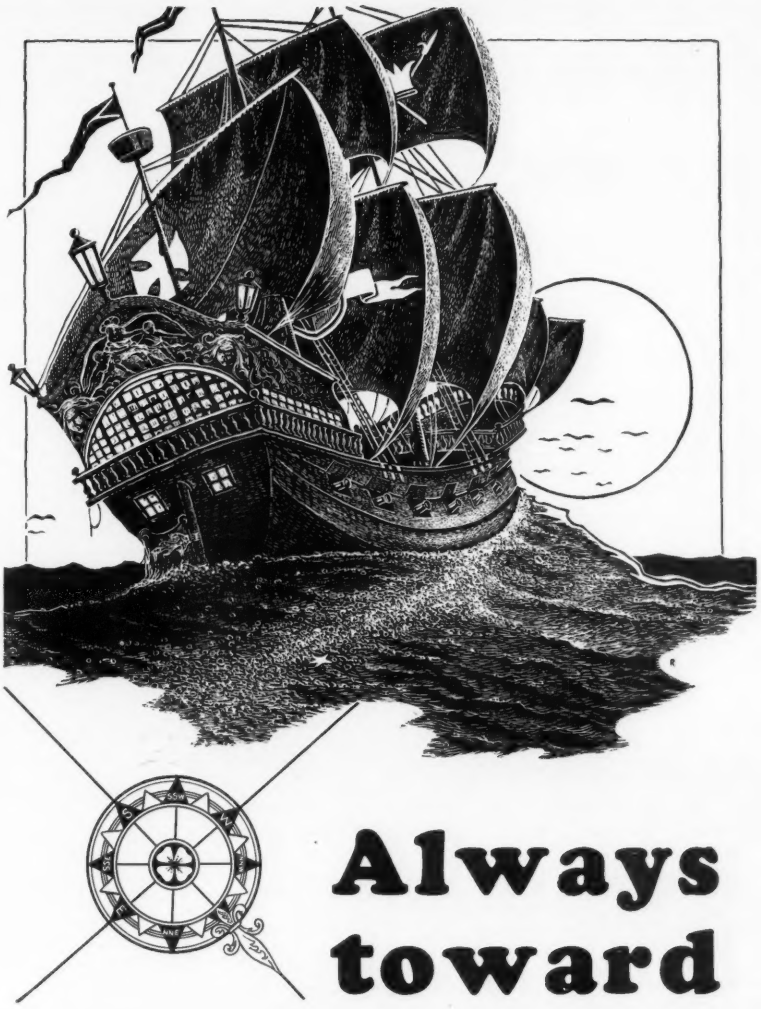
**Answer No. 6**

The Wire Association:

THIS will acknowledge receipt of your letter of the eleventh on the question of standardization of die casings.

We have been working on this very thing for the past several weeks and hope to offer you something definite within the near future.

We are very much convinced that standardization is not only in order, but is very desirable.

# Always toward the Future —

**Forty-seven years ago John Robertson invented the first lead-encasing die-block. Conceivably, the lead-covered cable industry might have muddled along without this die-block—at that time.**

**But John Robertson, in common with all inventive minds, looked always toward the future. Shortly, the enormous growth of the wire and cable industry made the die-block a necessity.**

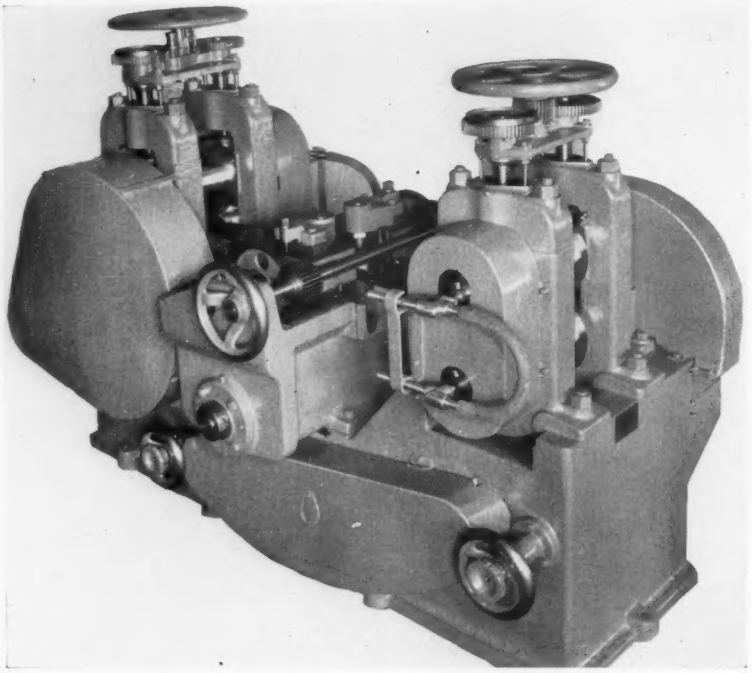
**And since then, continuously, the John Robertson Company has always maintained its lead—looking always toward the future. This is illustrated by the unquestioned leadership of Robertson lead presses and allied equipment here and abroad . . . A leadership best symbolized by a galleon sailing westward over uncharted seas, as Robertson has always done, anticipating a future need . . .**

**NOTE: Lead Encasing Presses of the latest approved design are built by Robertson in sizes to meet every manufacturing requirement. Also Hydraulic Pumps, Melting Furnaces, Dies, and Cores, Strippers, etc. We also make the Robertson Hydropneumatic Accumulator. WRITE FOR ROBERTSON BULLETINS FOR YOUR REFERENCE FILES.**

*John* ROBERTSON CO. INC. *Pioneers~Since 1858*

125-137 Water Street Brooklyn, N. Y

# Flat Wire Rolling Mill



**10″ Breakdown—5″ Edging—8″ Finishing Rolls Driven by 40/50 h. p. 3 to 1 Variable Speed Motor. Capacity 150 to 450 ft. per minute. Wire Straightening rolls, scarfing attachment, guides between rolls and Take-up stand to suit customer's needs.**

WE BUILD

Chain Draw Benches—Multiple Coil Winders.

Flat Wire Rolling Mills—Rod Pointers.

Hollow Wire Straighteners and Equipment.

Multiple Strand Bright Annealing Units.

Stranders to Customers' Specifications.

Reelers and Spoolers for all sizes of Wire and Cable.

Reelers and Spoolers for Tinning, Galvanizing, Patenting and Annealing.

**Frederick M. Conran**

Designer and Builder of Special Machinery

107 Colden Street Newark, N. J.


## The Production of Lead Encased Cable

(*Continued from page 182*)

15. A. How often is die-block cleaned out?

The die-block should be cleaned out as often as it is taken out of the press, every day, or after 40,000 lbs. of lead has been extruded thru the die-block. Wide variations from this figure are possible. On long runs the cores and dies become rough or oxides build up on them and the lead sheath is given a rough appearance. Frequent cleaning and polishing of cores and dies gives a better looking lead sheath.

16. Lubricant used, if any, in lead cylinder:
    A. Mineral Oil?
    B. Tallow?
    C. Other lubricant?

Mineral oil and tallow as well as lard oil are used, but should be used sparingly. Presses equipped with Robertson patent extrusion rams require much less lubricant in the extrusion cylinders.

17. Is temperature of lead in melting pot controlled?
    A. To what temperature?

The temperature in the lead melting pots should be controlled to 750 degrees Fah. for lead.

18. What is maximum allowable temperature of lead poured into extrusion cylinder?

Maximum temperature of lead poured into extrusion cylinder should not exceed 750 degs. Fah.

19. What is the maximum temperature of antimony alloy poured into lead cylinder?

Maximum temperature of antimony alloy poured into the lead cylinder should not exceed 850 degrees Fah. The temperature of the die-block, lead cylinder and melting pot have a definite effect on the product. These temperatures should be controlled.

✦ ✦ ✦

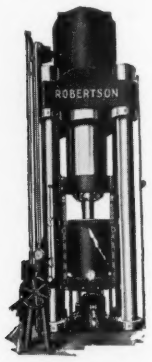
## Lead Sheath Failures

FAILURES in lead sheaths which are charged to either defective extrusion or lack of progress in press design may not be due to either of these causes. They may be due entirely to the design of the cable or the installation of the cable.

✦ ✦ ✦

A riser cable will develop a large head of oil which can contri-

bute to a split cable sheath due to pressure at the bottom or in a bend. Similarly, cables can be manufactured so that current or atmospheric heating builds up pressure against the lead which can find no other means or relief than by straining the sheath or causing a defect of mysterious appearance, which for lack of definite assignment of cause of defect is charged against a manufacturer as an "unknown cause."




Lead Cable Encasing Press Capacity 2500 Tons

THE process of lead encasing wires and cables is no longer a problem to be feared because lead encasing equipment in its latest form has a capacity for production which can be figured with mathematical precision, and this can be depended upon for manufacturing purposes. The quality of the lead sheath produced by this modern equipment is in keeping with the care exercised in an effort to control the various factors which enter into this production.

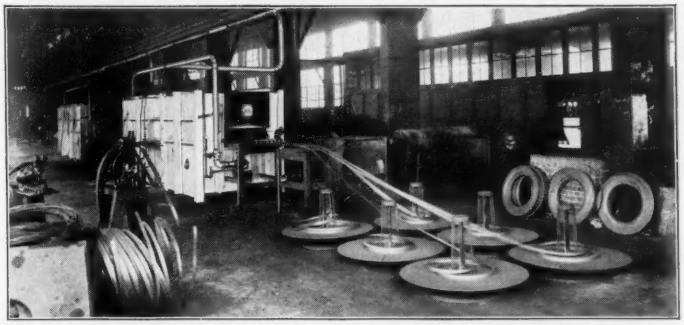
✦ ✦ ✦

**C. B. McNaught** resigned Feb. 25th as president of the Dominion Steel & Coal Corporation, giving as his reason a necessity for complete rest. Sir Newton J. Moore, senior, vice-president, was elected to the presidency and will take over the office as soon as possible," coming from England to reside in Canada, to give his entire time to the company.

The Second Article On Fourdrinier Wires and Cloths Will Appear in the July Issue.

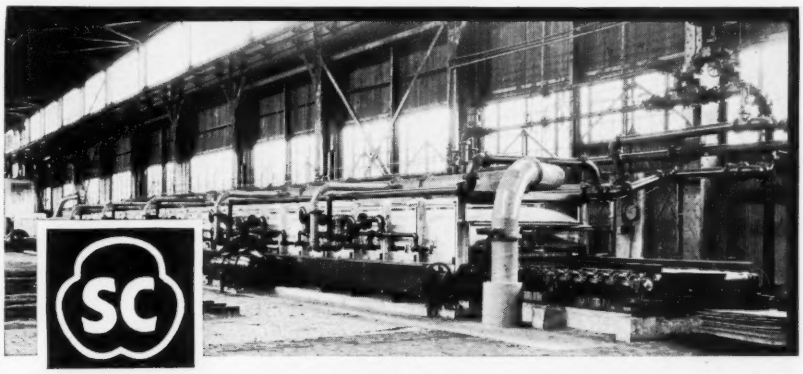

# ROCKWELL

## FURNACES
## ELECTRIC *and* FUEL
For Ferrous and Non-Ferrous Wire Products



Complete heating equipment for strand annealing, billet heating and intermediate operations.
Bright annealing furnaces for ferrous and non-ferrous metals.
Write for Catalog 323-B.

*"Furnace and Fuel to Suit Conditions"*
ELECTRICITY—GAS—OIL—COAL
W. S. ROCKWELL COMPANY
*Industrial Heating Equipment*
18 50 Church Street (Hudson Terminal Building) New York
Detroit, Chicago, Columbus, Cleveland, Indianapolis, Montreal, Toronto




# SC bright annealing gives accurate control

**Both furnace atmosphere and temperature must be accurate for delicate bright annealing of ferrous and non-ferrous metals.**

**THIS SC bright annealing furnace has handled tons of Monel Metal and nickel in its four years of operation. When it was installed, continuous bright annealing of ferrous metals was new, untried.**

**But today you have the assurance of simple, accurate control of furnace atmospheres... of precision adjustments of temperatures —to give you annealing that will meet any requirements you have. SC is able to give you this because of its extensive development work on bright annealing in recent years.**

**If you want to know more about bright annealing furnaces to handle any of your products, please write. No obligation, of course.**

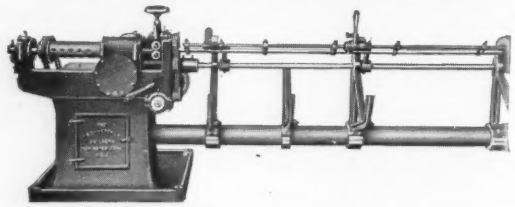
OPERATED BY HENRY L. DOHERTY & COMPANY
# Surface Combustion
TOLEDO, OHIO
*Sales and Engineering Service in Principal Cities*

*Also makers of* WIRE PATENTING FURNACES

**Absolutely Accurate Lengths of Wire Which Is Straight As a Die**

are cut on

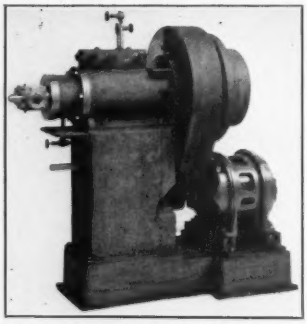
**SHUSTER**
**AUTOMATIC WIRE STRAIGHTENING AND CUTTING MACHINES**



**so simple they may be operated by unskilled labor, and so substantial that maintenance charges are trivial. Up-to-date Machines in every way.**

*Catalogue No. 30 on request*

**The F. B. Shuster Company, New Haven, Conn.**
***Straightener Specialists Since 1866***



Johnson Super Production Tubing and Straining Machine

**REDUCE YOUR RUBBER INSULATING COSTS**

Tremendous reductions made in insulating costs by more than doubling production in both straining and tubing operations.

✦ ✦ ✦

Conservative wire insulating capacity of machine of size shown is 20,000 to 50,000 feet per hour according to size and wall of rubber.

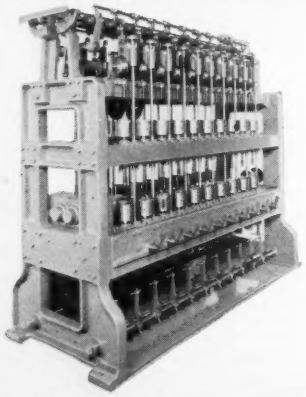
✦ ✦ ✦

Inquiries will bring complete data and prices.

**CORONE WIRE INSULATORS, INC.**

Sole Distributors under the Johnson Patents.

**Putnam, Conn.** **U. S. A.**



**LOWEST COST INSULATED WIRE**

is produced on the

**HIGH SPEED**
**Ball-Bearing Dynamic Balance**

Cotton, Silk or Paper Wire Covering Machines made by

Model OD-20 BB for wire .010 to .003 inch.

EST. 1855 AIMCO INC. 1918
"American" INSULATING MACHINERY COMPANY
REG. U.S. PAT. OFF.
PHILADELPHIA PENNSYLVANIA U.S.A.
517 Huntingdon St.

## Heating and Cooling Wire

(*Continued from page 194*)

be uniformly bright annealed with automatic control of temperature and atmosphere in a coal burning furnace. The disadvantages incident to coal may be offset in some plants by the lower cost, as in the case of house heating, when the more desirable but expensive forms of fuel are impracticable because of the amount of heat required.

✦ ✦ ✦

FURNACES designed to capitalize the unique and outstanding advantages of electric heating frequently make possible results in quality and cost of product and working conditions for the operatives far superior to any form of fuel furnace. It is ridiculous to consider electricity on the basis of energy cost alone in light of such conditions which may make any form of fuel relatively expensive regardless of price.

The nature of the heat-treating operation and plant conditions are the determining factors in selection of furnaces and means of heating them.

✦ ✦ ✦

### Selection of Equipment

SELECTION of equipment for heating, cooling and handling wire products is dependent upon the required standards of quality and uniformity in the product; working conditions for the operative; production requirements, with particular reference to variations in size and quantity of stock; and plant conditions affecting the design and layout of the complete equipment, relative price of fuel and electricity, and other assentials incident to operation.

The endless variety of product requirements and plant conditions, and continual change in methods of heating, cooling and handling to meet the demond for quality and lower cost, makes it necessary to deal with each case on its individual merits, with due regard to the economics of the operation of the plant as a whole.

## Wire Association To Hold Annual Meeting At Buffalo, N. Y., Oct. 3-8, 1932

THE wire industry will have an important share in the 1932 National Metal Congress and Exposition in Buffalo, Oct. 3-10.

✦ ✦ ✦

THE Wire Association, of which John Mordica, Supt. Rod & Wire Mill, Bethlehem Steel Co., Sparrows Pt., Md., is president, L. D. Granger, chief metallurgist, Wickwire Spencer Co., New York, and Herbert Horsfall, President, Canadian Wire & Cable Co., Ltd., Toronto, are vice-presidents, and R. E. Brown, Wire and Wire Products, New York City, is secretary, will have a series of meetings as part of the Congress, while a number of manufacturers of wire and wire drawing equipment have reserved space in the National Metal Exposition.

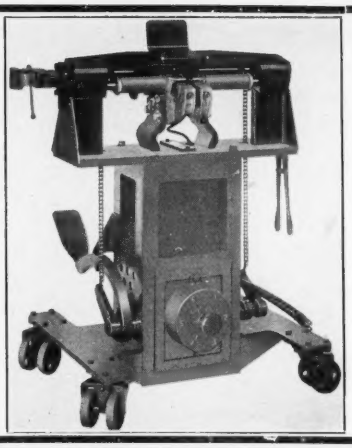
Besides the Wire Association, the following technical societies will cooperate with the A. S. S. T. in the Congress: American Welding Society; the Institute of Metals and the Iron & Steel Divisions of the American Institute of Mining and Metallurgical Engineers; the Iron and Steel Division of the Society of Automotive Engineers.

Although floor plans for the Metal Exposition were only distributed recently reservations for exhibit space already cover almost 70% of the available 50,000 square feet.

The drill hall of the 174th Regiment Armory provides ideal location for the Exposition because all booths will be located in one immense room, well ventilated and free from pillars or similar obstructions. An ample number of attractive meeting rooms is available at the Armory.

✦ ✦ ✦

PRECISION Spring Corporation 5900 Federal Ave., Detroit, has been organized by A. H. Peterson, 2251 Ferris Ave., and Milton W. Klockner, with capital of $125,000 to manufacture steel springs, metal stampings, and kindred products.

MICRO-WELD MODEL K

The Welding Machine that makes High Speed, Multiple Block, Continuous Wire Drawing practical.

Precision Built—Automatic

Let us tell you why leading Wire Producers use Micro-Welds.

MICRO PRODUCTS CO.
116 N. Washington St., Peoria, Ill.
European Office, H. A. Schlatter & Co., Zurich, Switzerland

MACHINES FOR COATING WIRE with RUBBER, PLASTIC or FLUX

▲ ▲ ▲

Your Inquiries Solicited

JOHN ROYLE & SONS
Straight & Essex Sts., Paterson, N. J.

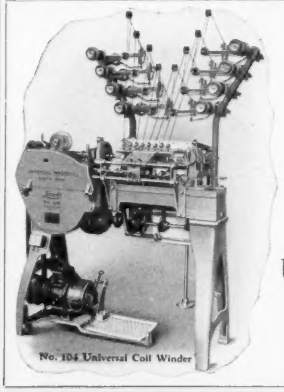
WIRE BRAIDING MACHINES

SINGLE, DOUBLE OR TRIPLE DECK
VERTICAL OR HORIZONTAL TYPE

Designed and constructed to insure an efficient and profitable output.

Write for complete information today.

NEW ENGLAND BUTT COMPANY
Dept. W-6, Providence, R. I.
CHICAGO OFFICE—20 NORTH WACKER DRIVE


No. 104 Universal Coil Winder

An interesting development for more efficiently producing paper-insulated coils. Paper is injected automatically without attention from the operator. Fully adjustable for a wide range of coil and wire sizes.

Six other machine types complete a line of coil winders answering any possible manufacturing need.

Catalog is available on request.

UNIVERSAL WINDING COMPANY
BOSTON

LEESONA

# GRIT- FREE

●In these penny-saving days excessive replacement costs for wire dies should not and need not be borne. When gritty lime is used dies are quickly scratched and worn.

BELL MINE ROTARY KILN PULVERIZED

# L I M E

—is uniformly grit-free lime with exceptional adhesive and covering qualities.

*Manufactured by the American Lime & Stone Co., Bellefonte, Pa. Sales Offices at Pittsburgh, Philadelphia, New York City and Wilmington.*

Bell Mine Products

BRAND

**"B"**

**Wire Drawing Soap Powder**

Made from high titre Palm Oil stock for high carbon drawing. Proven by test to lower costs and improve efficiency.

**Manufactured exclusively for wire drawing by**

**THE J. T. ROBERTSON CO., INC.**

SYRACUSE, N. Y.

*Wire drawing soap specialists since 1893.*

# STEELSKIN

REG. U. S. PAT. OFFICE

**For High or Low Carbon Wire**

**WIRE DRAWING SOAPS**

Established 25 years.

R. H. MILLER CO., Inc. Homer, N. Y.


## Repeaters

(*Continued From Page 189*)

heavy, requiring strenuous continued work by several operators. By mechanical means the operators are eliminated and the work continues smoothly. Installation of the nine mechanical repeaters now in use on the mill described above has released eight men from the mill crew and increased the production approximately 60%.

✦ ✦ ✦

IT might be thought that these mechanical devices will not be flexible in a roughing stand. Actually, there is considerable flexibility. Each of the repeaters has anticipated the necessity for flexibility required in going to different passes in the roll. Also, it is not necessary that these same sections be rolled or that the reduction should be the same as was given in this illustration. Different mills might also require a different combination and a different number of repeaters. A more intimate study of the actual practice in a particular mill will reveal quickly where repeaters can be used to advantage and what repeaters can be so used.

The Aetna Standard Engineering Co. of Youngstown, O., have been licensed by the Western Electric Co. to manufacture repeaters of the type described.

## Sharon Steel Hoop Operating New Strip Mill

SHARON Steel Hoop Company has started regular operation of its new four-high strip finishing mill, built by the United Engineering & Foundry Company, Pittsburgh. The new unit is capable of rolling strips up to 20 inches in width. It is an extension of the present continuous hot strip mill and replaces the former two high finishing stands.

The Second Article On Fourdrinier Wires and Cloths Will Appear in the July Issue

## New Sales Idea for Diamond Dies

A NOVEL method of merchandizing diamond dies has been developed by the Master Wire Die Corp. of New York, N. Y.

Diamond dies are now sold by this Company with definite guarantees as to maximum openings and unqualified guarantees against breakage on all classes of materials, including high carbon steel.

The guarantees are against any breakage in ordinary use which prevents further usefulness in drawing at any size within the limits given in the table below.

**Maximum Guaranteed Size Inches**

| Diamond Size Sybmol | Base Size Inches | H. C. Steel | L. C. Steel Bronze Nickel Nickel Alloys | Copper Aluminum |
|---|---|---|---|---|
| A | .010 | .015 | .020 | .025 |
| B | .015 | .020 | .025 | .030 |
| C | .020 | .025 | .030 | .040 |
| D | .025 | .030 | .035 | .050 |

✦ ✦ ✦

ADJUSTMENTS are made in case of breakage in accordance with the table on a basis of the unused millage in the die at the time of breakage. For instance, if a "B" die breaks in drawing H. C. Steel at .018, credit would be allowed on the purchase of a new die as follows:

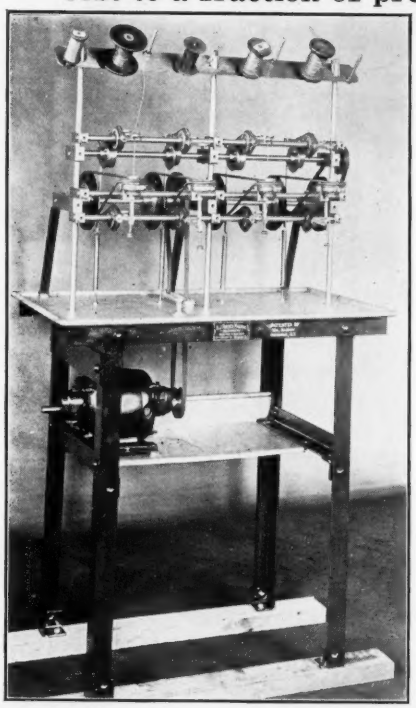
> A size "B" die on H. C. Steel at base size and price has five usable mills for $18.00 or $3.60 per mill. At size .018 theer should be two usable mills left so credit would be given for two mills at $3.60 or $7.20.

---

THROUGH acquisition of the Calumet and Arizona Mining Company, and prior acquisition of the Nichols Copper Company and the National Electric Products Corporation, Phelps Dodge Corporation is one of the three large units in the copper industry in the United States. Its operations extend from mine to market.

An Article On a New Heat Application For Hot Galvanizing By W. H. Spowers, Jr. Consulting Galvanizing Engineer Will Appear in the July Issue


**The Haddow Die Re-Cutting and Polishing Machine will lower your die re-cutting cost to a fraction of present costs**



Why do you continue to pay a die cutter and pay for diamond dust to remove a large percentage of your diamond from your dies? Diamond that has done no work—when, by the use of the Haddow Die Recutting Machine you may use practically all your diamonds to draw wire, especially in the small sizes.

**ONE MONTH'S SHOP PRODUCTION**

Total number of dies cut —1047

Total number of hours required—182.5

Average number of dies per hour—5.73

Number of operators—1

With only one man—This machine will do the work now requiring four to six men in less time and at lower cost.

4 HEAD MACHINE—Also Made in 6-Head size (With 2 Heads for Heavier Dies).

**WILLIAM HADDOW**
17 Eastern Ave.
Ossining, N. Y.

**BALLOFFET**
The Quality Diamond Dies

1870 1932

**BALLOFFET DIAMOND WIRE DIES CO. INC.,**
13-15 East 22nd Street, New York City
Factories in France: Lagnieu-Cluses-Trevoux

**The crack trains, which pay best, are trusted solely to men, who have learned from—*Experience*.**

—As wire drawers for over 30 years, we know from *Experience* the particular shape of die for each material. We have found from this same experience that our special casting method of setting is best.

Why not let us quote on your diamond die requirements?

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**WIRE DRAWING MACHINERY AND EQUIPMENT**

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General Castings for Wire Mill use.

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TRENTON, N. J.

**Broden Construction Co.**

*Wire Mill and Cold Rolling Equipment*

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## Non-Ferrous Metals In Wire Cloth---1931

THE American Bureau of Metal Statistics have received reports respecting the use of non-ferrous metals in the manufacture of wire cloth in 1931 from 35 companies as follows, in tons of 2,000 lbs.:

| | Total reported. | Content — Copper. | Zinc. | Tin. |
|---|---|---|---|---|
| Copper | 585 | 585 | ..... | ..... |
| Brass | 2,621 | 2,170 | 451 | ..... |
| Bronze | 239 | 220 | ..... | 19 |
| Totals | 3,445 | 2,975 | 451 | 19 |
| Galvanized, | | | | |
| hot | 23,527 | ..... | 6,287 | ..... |
| electro | 5,595 | ..... | 453 | ..... |

Correlation of these data with totals reported by the Bureau of Census for 1927 and 1929 enables us to make the following estimate for the entire industry.

| | | | |
|---|---|---|---|
| **Wire Cloth—Copper** | | | |
| 1924 | 2,400 | 1928 | 2,900 |
| 1925 | 2,300 | 1929 | 3,080 |
| 1926 | 2,200 | 1930 | 4,120 |
| 1927 | 2,470 | 1931 | 975 |
| **Wire Cloth—Brass** | | | |
| 1924 | 2,100 | 1928 | 4,400 |
| 1925 | 3,300 | 1929 | 6,300 |
| 1926 | 4,800 | 1930 | 5,550 |
| 1927 | 3,700 | 1931 | 4,300 |
| **Wire Cloth—Bronze** | | | |
| 1924 | 550 | 1928 | 500 |
| 1925 | 450 | 1929 | 660 |
| 1926 | 300 | 1930 | 430 |
| 1927 | 400 | 1931 | 400 |
| **Copper Content** | | | |
| 1924 | 4,500 | 1928 | 7,000 |
| 1925 | 5,300 | 1929 | 9,000 |
| 1926 | 6,300 | 1930 | 9,200 |
| 1927 | 6,700 | 1931 | 4,900 |

The Second Article
on
Fourdrinier Wire and Cloths
Will Be Published In
the July Issue of
Wire and Wire Products

An Article On A
New Heat Application
For Hot Galvanizing
By
W. H. Spowers, Jr.
Consulting Galvanizing Engineer
Will Appear In the
July Issue

**Wire Drawing Diamond Dies**

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**WIRE DIE CORPORATION**

300 W. 56th ST., NEW YORK

Tel. Col. 5-1340

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Consulting Engineer
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**The Waterbury Wire Die Co.**

**Diamond, Composition and CHILLED IRON DIES**
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# BUYERS' GUIDE

**For more complete information, consult the annual Directory, Index & Buyers' Guide.**

**ANNEALING FURNACES**
See Furnaces—Various Headings

**ANNEALING POTS AND BOXES**
National Wrought Iron Annealing Box Co., Washington, Pa.
Scudder, E. J., Fdry & Machine Co., Trenton, N. J.

**ARMORING EQUIPMENT**
Amer. Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
John Robertson Co., Brooklyn, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

**BAKERS**
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

**CASTINGS—Wire Mill**
E. J. Scudder Foundry & Machine Co., Trenton, N. J.

**CHROME NICKEL—Construction**
National Wrought Iron Annealing Box Co., Washington, Pa.

**CLEANING & PICKLING EQUIPMENT**
Broden Construction Co., Cleveland, O.
Fred'k M. Conran, Newark, N. J.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

**COILERS—Sheet and Wire**
H. J. Ruesch Machine Co., Newark, N. J.

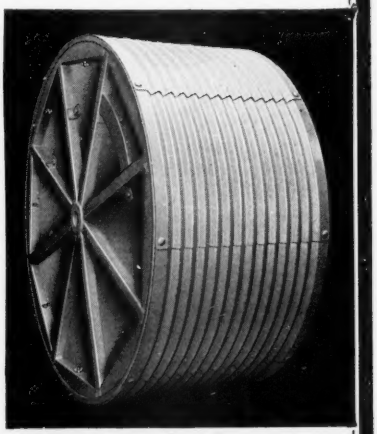
**COMPOUNDS—Insulating**
Corone Wire Insulators, Inc., Putnam, Conn.

**CRANES—Wire Mill**
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

**DIES—Chilled Iron**
Waterbury Wire Die Co., Waterbury, Ct.


"Red Head"

Steel reels



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**DIES—Composition**
Diamond Die Co., of America, New York, N. Y.
Vianney Wire Die Works, New York, N. Y.

**DIES—Diamond**
Balloffet Diamond Wire Dies Co., Inc., N. Y. C.
Cochaud Wire Die Co., New York.
Diamond Die Co., of America, New York, N. Y.
Driver-Harris Co., Harrison, N. J.
Master Wire Die Co., New York, N. Y.
Vianney Wire Die Works, New York.
Waterbury Wire Die Co., Waterbury, Ct.

**DIES—Lead Extrusion**
John Robertson Co., Brooklyn, N. Y.

**DIES—Repairs & Re-Cutting**
Balloffet Diamond Wire Dies Co., Inc., N. Y. C.
Cochaud Wire Die Corp., New York.
Diamond Die Co., of America, New York, N. Y.
Driver-Harris Co., Harrison, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.
William Haddow, Ossining, N. Y.
Vianney Wire Die Wks., N. Y.

**DIES—Recutting and Repolishing Machine**
Wm. Haddow, Ossining, N. Y.
Vianney Wire Die Works, New York, N. Y.

**DIES—Rod and Tube Drawing**
Carboloy Co., Inc., Newark, N. J.
Diamond Die Co., of America, New York, N. Y.
Firth-Sterling Steel Co., McKeesport, Pa.
Master Wire Die Co., New York, N. Y.
Vianney Wire Die Works, New York, N. Y.

**DIES—Tantalum Carbide**
Diamond Die Co. of America, New York, N. Y.
Vianney Wire Die Works, New York, N. Y.

**DIES—Tungsten Carbide**
Carboloy Co., Inc., Newark, N. J.
Driver-Harris Co., Harrison, N. J.
Master Wire Die Co., New York, N. Y.
Vianney Wire Die Works, New York, N. Y.

**DRAW BENCHES—**
H. J. Ruesch Machine Co., Newark, N. J.
Scudder, E. J., Fdry & Machine Co., Trenton, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.

**FURNACES—Annealing**
W. S. Rockwell Co., New York, N. Y.
Surface Combustion Co., Toledo, O.

**FURNACES—Automatic**
W. S. Rockwell Co., New York, N. Y.
Surface Combustion Co., Toledo, O.

**FURNACES—Bright Annealing**
W. S. Rockwell Co., New York, N. Y.
Surface Combustion Co., Toledo, O.

**FURNACES—Electric**
W. S. Rockwell Co., New York, N. Y.
Surface Combustion Co., Toledo, O.

**FURNACES—Lead Melting**
John Robertson Co., Brooklyn, N. Y.

**FURNACES—Non-Oxidizing**
W. S. Rockwell Co., New York, N. Y.
Surface Combustion Co., Toledo, O.

**FURNACES—Wire**
W. S. Rockwell Co., New York, N. Y.
Surface Combustion Co., Toledo, O.

**GALVANIZING ENGINEER**
W. H. Spowers, Jr., New York, N. Y.

**GALVANIZING KETTLES—**
National Wrought Iron Annealing Box Co., Washington, Pa.

**INHIBITORS—**
Wm. M. Parkin & Co., Pittsburgh, Pa.

**INSULATING COMPOUNDS**
Corone Wire Insulators, Inc., Putnam, Conn.

**LATHES—Die Reaming**
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

**LIME—Pulverized**
Amer. Lime & Stone Co., Bellefonte, Pa.

**LUBRICANTS—Wire Drawing**
R. H. Miller Co., Homer, N. Y.
J. T. Robertson Co., Syracuse, N. Y.

**MACHINE—Die Re-cutting and Polishing**
Wm. Haddow, Ossining, N. Y.

**MACHINERY—Armoring (Cable, Wire Hose)**
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
John Robertson Co., Brooklyn, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Braiding**
Mossberg Pressed Steel Corp., Attleboro, Mass.
New England Butt. Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Bunching**
Amer. Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence. R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Bundling**
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Cable, Electric**
American Insulating Machinery Co., Philadelphia, Pa.
Fred'k M. Conran, Newark, N. J.
New England Butt Co., Providence, R. I.
Watson Machine Company, Paterson, N. J.

**MACHINERY—Chain Making**
Fred'k M. Conran, Newark, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.

**MACHINERY—Closing**
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Paper Insulated Coils**
Universal Winding Co., Providence, R. I.

**MACHINERY—Coil Winding**
Amer. Insulating Mach'y Co., Phila., Pa.
Fred'k M. Conran, Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Universal Winding Co., Providence, R. I.

**MACHINERY—Coilers**
Broden Const. Co., Cleveland, O.
Fred'k M. Conran, Newark, N. J.
H. J. Ruesch Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
United Eng. & Fdy. Co., Pittsburgh, Pa.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Copper Wire Drawing and Rolling**
H. J. Ruesch Machine Co., Newark, N. J.
United Eng. & Fdy. Co., Pittsburgh, Pa.
Vaughn Machinery Co., Cuyahoga Falls, O.

**MACHINERY—Cutting**
American Insulating Mach'y Co., Phila., Pa.
Broden Construction Co., Cleveland, O.
F. B. Shuster Co., New Haven, Conn.
Sleeper & Hartley, Worcester, Mass.
United Eng. & Fdy. Co., Pittsburgh, Pa.

**MACHINERY—Enameling**
American Insulating Mach'y Co., Phila., Pa.

**MACHINERY—Extruding**
John Robertson Co., Brooklyn, N. Y.
John Royle & Sons, Paterson, N. J.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Flat Wire**
Broden Construction Co., Cleveland, O.
Fred'k M. Conran, Newark, N. J.
H. J. Ruesch Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

**MACHINERY—Forming**
Sleeper & Hartley, Inc., Worcester, Mass.

**MACHINERY—Galvanizing Wire**
Broden Construction Co., Cleveland, O.
Fred'k M. Conran, Newark, N. J.
Morgan Construction Co., Worcester, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

**MACHINERY—Gang Winders**
H. J. Ruesch Machine Co., Newark, N. J.
Watson Machine Co., Paterson, N. J.

# BUYERS' GUIDE, Continued

**MACHINERY—Insulating**
**American Insulating Machinery Co., Phila.**
Corone Wire Insulators, Inc., Putnam, Conn.
**New England Butt Co., Providence, R. I.**
John Royle & Sons, Paterson, N. J.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Lead Encasing Presses, etc.**
John Robertson Co., Brooklyn, N. Y.

**MACHINERY—Lead Stripping**
John Robertson Co., Brooklyn, N. Y.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Lock Washer**
Sleeper & Hartley, Inc., Worcester, Mass.

**MACHINERY—Magnet Wire**
American Insulating Mach'y Co., Phila., Pa.
Sleeper & Hartley, Inc., Worcester, Mass.

**MACHINERY—Measuring Wire & Cable**
New England Butt. Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Nail**
**Sleeper & Hartley, Inc., Worcester, Mass.**
Vaughn Machinery Co., Cuyahoga Falls, O.

**MACHINERY—Panning**
**American Insulating Machinery Co., Phila.**

**MACHINERY—Pointing**
Broden Construction Co., Cleveland, O.
Fred'k M. Conran, Newark, N. J.
**Morgan Construction Co., Worcester, Mass.**
H. J. Ruesch Machine Co., Newark, N. J.
**E. J. Scudder Foundry & Machine Co., Trenton, N. J.**
Sleeper & Hartley, Inc., Worcester, Mass.
**Vaughn Machinery Co., Cuyahoga Falls, O.**

**MACHINERY—Rod**
Broden Construction Co., Cleveland, O.
Fred'k M. Conran, Newark, N. J.
Morgan Const. Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.
United Eng. & Fdy. Co., Pittsburg, Pa.
Vaughn Machinery Co., Cuyahoga Falls, O.

**MACHINERY—Rolling Mill**
Broden Construction Co., Cleveland, O.
Fred'k M. Conran, Newark, N. J.
Morgan Construction Co., Worcester, Mass.
H. L. Reusch Machine Co., Newark, N. J.
United Eng. & Fdy. Co., Pittsburgh, Pa.
Vaughn Machinery Co., Cuyahoga Falls, O.

**MACHINERY—Rubber Strip Covering**
American Ins. Mach'y Co., Phila., Pa.
Corone Wire Insulators, Inc., Putnam, Conn.
John Royle & Sons, Paterson, N. J.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Rubber Tubing and Straining**
Corone Wire Insulators, Inc., Putman, Conn.
John Royle & Sons, Paterson, N. J.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Screw Wire**
**Sleeper & Hartley, Inc., Worcester, Mass.**

**MACHINERY—Special**
Broden Construction Co., Cleveland, O.
Fred'k M. Conran, Newark, N. J.
H. J. Ruesch Machine Co., Newark, N. J.
E. J. Scudder Foundry and Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Spooling**
**American Insulating Machinery Co., Phila.**
Fred'k M. Conran, Newark, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Spring Making**
**Sleeper & Hartley, Inc., Worcester, Mass.**

**MACHINERY—Staple**
**Sleeper & Hartley, Inc., Worcester, Mass.**

**MACHINERY—Straightening**
Broden Construction Co., Cleveland, O.
H. J. Ruesch Machine Co., Newark, N. J.
F. B. Shuster, New Haven, Conn.
**Sleeper & Hartley, Inc., Worcester, Mass.**

**MACHINERY—Straightening Hollow Wire**
Fred'k M. Conran, Newark, N. J.

**MACHINERY—Stranding**
American Insulating Mach'y Co., Phila Pa.
Fred'k M. Conran, Newark, N. J.
**New England Butt Co., Providence, R. I.**
**Sleeper & Hartley, Inc., Worcester, Mass.**
**Watson Machine Co., Paterson, N. J.**

**MACHINERY—Strip Steel**
Broden Const. Co., Cleveland, O.
Fred'k M. Conran, Newark, N. J.
H. J. Ruesch Machine Co., Newark, N. J.
United Eng. & Fdy. Co., Pittsburgh, Pa.

**MACHINERY—Swaging**
H. J. Ruesch Machine Co., Newark, N. J.
Sleeper & Hartley, Worcester, Mass.

**MACHINERY—Taping**
Amer. Insulating Mach. Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Watson Machine Company, Paterson, N. J.

**MACHINERY—Trolley Wire**
Vaughn Machinery Co., Cuyahoga Falls, O.

**MACHINERY—Tube Mill**
Fred'k M. Conran, Newark, N. J.
H. J. Ruesch Machine Co., Newark, N. J.

**MACHINERY—Welding Wire**
Micro Products Co., Peoria, Ill.
Vaughn Machinery Co., Cuyahoga Falls, O.
F. B. Shuster Co., New Haven, Conn.

**MACHINERY—Winding**
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
**Sleeper & Hartley, Inc., Worcester, Mass.**
Universal Winding Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Wire Drawing**
**American Insulating Machinery Co., Phila.**
**Broden Const. Co., Cleveland, Ohio.**
Fred'k M. Conran, Newark, N. J.
**Morgan Construction Co., Worcester, Mass.**
H. J. Ruesch Machine Co., Newark, N. J.
**E. J. Scudder Foundry & Machine Co., Trenton, N. J.**
**Sleeper & Hartley, Inc., Worcester, Mass.**
**Vaughn Machinery Co., Cuyahoga Falls, O.**

**MACHINERY—Wire Rope**
New England Butt Co., Providence, R. I.
Watson Machine Company, Paterson, N. J.

**PACKING—Metallic Fibre**
Hudson Wire Co., Ossining, N. Y.

**POTS—Lead Melting**
John Robertson Co., Brooklyn, N. Y.

**PRESSES—Lead Encasing**
John Robertson Co., Brooklyn, N. Y.

**PRESSES—Lead Extrusion**
John Robertson Co., Brooklyn, N. Y.

**PULLERS—Wire**
E. J. Scudder Fdry. & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

**PUMPS—Hydraulic**
John Robertson Co., Brooklyn, N. Y.

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**R. B. Hayward Co., Chicago, Ill.**
**Hubbard Spool Co., Chicago, Ill.**
**Mossberg Pressed Steel Corp., Attleboro, Mass.**

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**REEL CRUTCHES**
R. B. Hayward Co., Chicago, Ill.
Watson Machine Co., Paterson, N. J.

**ROLLING MILLS—See Machinery—Rolling Mill**

**SOAPS—Wire Drawing**
R. H. Miller Co., Homer, N. Y.
J. T. Robertson Co., Syracuse, N. Y.

**STEEL PLATE CONSTRUCTION—**
National Wrought Iron Annealing Box Co., Washington, Pa.

**TANKS—Compound**
Watson Machine Co., Paterson, N. J.

**TANKS—Steel Plate**
National Wrought Iron Annealing Box Co., Washington, Pa.

**TRUCKS**
**Morgan Construction Co., Worcester, Mass.**
**Vaughn Machinery Co., Cuyahoga Falls, O.**

**TUBE BENDERS AND FORMERS**
H. J. Ruesch Machine Co., Newark, N. J.

**VULCANIZERS**
John Royle & Sons, Paterson, N. J.
Watson Machine Co., Paterson, N. J.

**VULCANIZING PANS**
American Insulating Mach'y Co., Phila., Pa.

**WIRE—Enameled For Coils**
Winsted Insulated Wire Co., Winsted, Conn.

**WIRE—Nickel Silver and Phosphor Bronze**
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.

**WIRE—Various Kinds**
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.
Winsted Insulated Wire Co., Winsted, Conn.

This is a carefully classified index of concerns who specialize in this industry and who advertise regularly in WIRE & WIRE PRODUCTS. Please mention WIRE when writing to these firms.


## Announcing the Establishment of a Translation Bureau By Wire and Wire Products

This translation service is under the supervision of trained engineers familiar with the rod, wire and strip industry.

All translations will be technically correct

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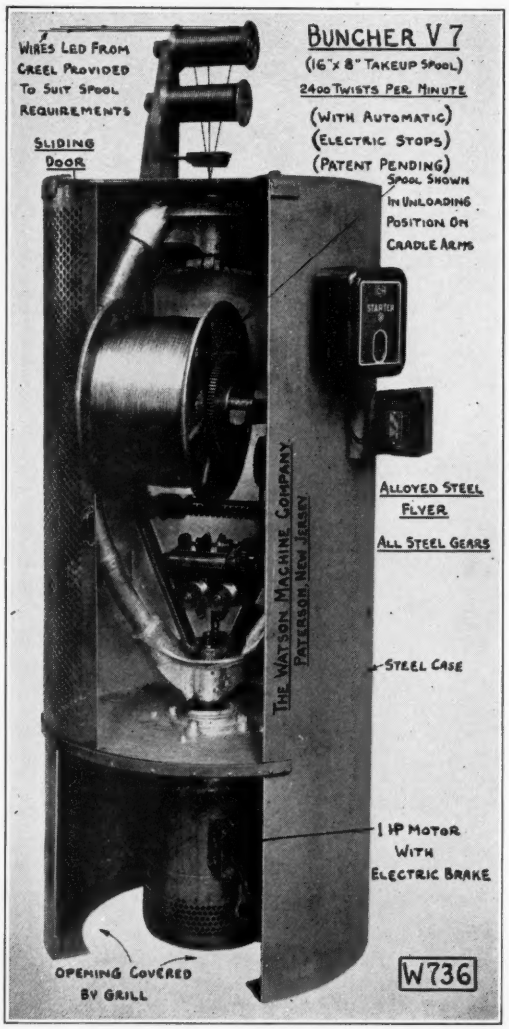
Translation Bureau, Wire and Wire Products : : : 551 Fifth Avenue, New York, N. Y.

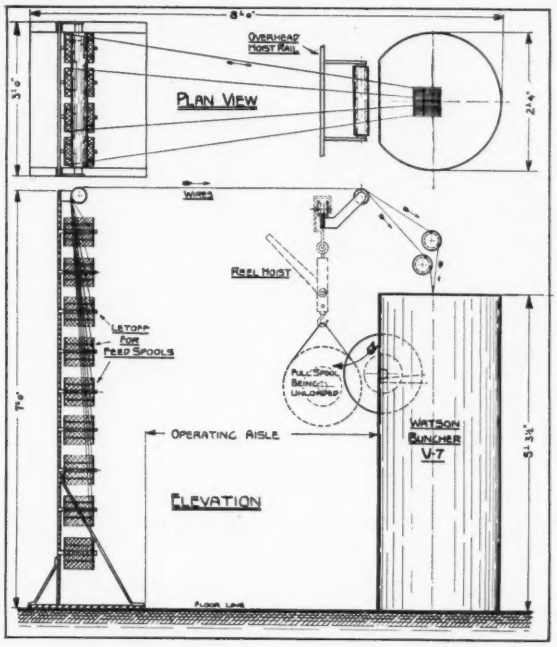
# THE WATSON MACHINE COMPANY

ESTABLISHED 1845

PATERSON, NEW JERSEY, U. S. A.

## WATSON BUNCHER V 7 (PATENT PENDING)




**For the bunching of Lamp Cords, Antenna and similar fine wire strands, up to 250 mils in over-all diameter. At 2400 twists per minute this unit produces 10,000 feet per hour of strand at 1" lay, production varying directly up or down as the lay increases or decreases from 1".** (*Strands having tensile strengths as low as 1 pound have been run on this machine, so it will be seen that its range covers any requirement in light bunching*).

Standard Takeup Reel is 16" diameter by 8" traverse (*being our standard 250-pound reel*). For removing from cradle it is run out on extension arms, as shown on photo, where a hand hoist on cross rail (*see space diagram*) picks it up to carry it along aisle. This rail extends along entire aisle in multiple unit installations. With the operator in the aisle between feed and takeup, and by the use of electric stops, he is able with ease to operate eight of these units. In cases where the production of one spindle covers requirements it will be found that this machine can be operated easily by an operator in addition to some other present machine, thus entailing no additional labor cost.

Feed Creel with Spindles for up to 64 (*25-lb.*) spools is provided to suit customer's spools (*see space diagram for general outline*).

Double Grooved Capstans are provided, Lay range of ½" to 2.3" being possible, with standard gears for ¾", 1", 1¼" 1⅝" lays being provided with machine. Lay changes are rapidly and easily effected.

A. C. Electrical Equipment, including motor, brake, starter, automatic stops and safety switch on door, and wiring is provided, so that feed line to starter need only be attached by customer.

The Frame is of steel, the Flyer of alloyed steel, the Cradle and its gearing of steel. There are but four main bearings, these being ball bearings. Cradle bearings are oilless. All arm sheaves are on ball bearings. But six lubrication points exist in the machine. The Flyer is completely enclosed, with the slide door so arranged as to prevent machine being started unless door is fully closed.

ELECTRICAL WIRE AND CABLE, WIRE ROPE AND CORDAGE MACHINERY

# FORESIGHT

THE WORLD'S LARGEST MAKER OF ROLLS AND ROLLING MILL EQUIPMENT

70" UNITED Heavy Duty Roll Lathe—the largest ever built—to serve the high production rolling mills recently installed . . . and those now under construction . . . and others definitely projected.

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